

FISHES COLLECTED BY THE UNITED STATES FISHERIES
STEAMER "ALBATROSS" IN SOUTHERN CALIFORNIA
IN 1904.

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During the spring and summer of 1904 the *Albatross* was detailed for bathybial investigations in southern California. An extensive series of dredgings were taken in the San Diego region, and another in Monterey Bay, the two being connected by a third series, taken at intervals along the intervening stretch of coast. The fishes obtained form the basis of the present paper, the following genera and species being described as new:

Raja montereyensis.

Xenognathus, new genus (Alepocephalidae).

Xenognathus profundorum.

Lampanyctus ritteri.

Zastomias, new genus (Stomiidae).

Zastomias scintillans.

Melamphaës bispinosus.

Melamphaës nycterinus.

Sebastodes wilsoni.

Icelinus fuscescens.

Asterotheca, new genus (Agonidae).

Xenopyxis, new subgenus (Agonidae).

Xeneretmus leiops.

Xeneretmus ritteri.

Paraliparis caudatus.

Paraliparis albescens.

Lipariscus, new genus (Liparididae).

Lipariscus nanus.

Embryx parallelus.

Maynea californica.

Lycogramma, new genus (Zoarcidae).

Bothrocarra remigera.

Lycodapus mandibularis.

Lycodapus lycodon.

Lycodapus attenuatus.

Lycodapus grossidens.

Nematonurus abyssorum.

Monoceratias, new genus (Ceratiidae).

Monoceratias acanthias.

RAJA INORNATA Jordan and Gilbert.

Station 4452, Monterey Bay, 49-50 fathoms.

An embryo in the egg case with yolk about two-thirds absorbed, and a young specimen 180 mm. long were secured from this station.

In the embryo, the contour of the snout is very broadly rounded, the extreme tip abruptly protruding. None of the spines are yet free but the primary spines can be made out recumbent beneath the integument. Two in front of eye and one on posterior superior orbital rim are evident. And on the median line of back, an unbroken series extends from the posterior edge of branchial area to the first dorsal fin. The anterior three of these are hard and spinous, and longer than those which follow, the third somewhat weaker than the first two. The fourth and fifth are small, weak, and flexible, and the remainder of the series are hard and spinous, though smaller than the anterior three. In the freshly hatched young the three primary ocular spines appear and are for a time the only spines present on the orbital margin. Later, the number is increased through the intercalation of secondary spines.

We have no postembryonic specimens showing an uninterrupted series along back. The first three typically appear, though occasionally only the first two are present, then follows an interval where were found in the embryo the rudiments of two or three weaker spines; and finally, beginning opposite the anterior ventral lobe, the remainder of the series. It is not known whether the weak fourth and fifth spines of the series fail to break through or whether after doing so they retrograde.

RAJA RHINA Jordan and Gilbert.

List of stations.

4365	Near San Diego.....	Fathoms. 130-158
4452	Monterey Bay.....	49- 50

Three young specimens, 170 to 225 mm. long.

As stated by Starks,¹ the young of *R. inornata* and *R. rhina* are difficult to separate, as the characteristic form of the disk in *R. rhina* has not yet developed, and the spines and color are then very similar. A difference in the primary spines seems, however, constant and diagnostic. In our youngest specimens the orbital spines are distinctly larger than in *R. inornata*, and the anterior of the median dorsal series is always very strong and single, a wide gap separating it from the succeeding spines of the series. In *R. inornata* the anterior dorsal spines are smaller and are always present in a series of three (or rarely two). There are in this collection no embryos of *R. rhina* which

¹ Ann. Carnegie Mus., vol. 7, 1911, p. 172.

would permit us to determine whether the median row of the back are laid down as a continuous series, as in *R. inornata*. But three embryos from a previous collection (station 3106, off San Francisco Bay, 77 fathoms) seem to throw light on this question. They are 120, 125, and 145 mm. long, and all agree in having the rudiments of the dorsal spines distinctly shown and in having an area along the middle of the back between the anterior of the series and the base of the ventrals in which no rudiments are present. These specimens were identified in a former communication as *R. inornata*,¹ and an attempt was made without success to trace in older specimens of *R. inornata* the supposed development of the spines in the gap as a secondary growth. It seems now, however, that these were the young of *R. rhina*, in which the gap is a primitive feature, while in *R. inornata* the series is primitively complete and the gap develops by the later suppression of a few of the intermediate spines.

RAJA MONTEREYENSIS, new species.

Plate 14, fig. 1.

Type-specimen.—Cat. No. 75806, U.S.N.M., a young female, 198 mm. long, from station 4531, Monterey Bay, off Santa Cruz, California, depth 26–28 fathoms.

Probably most nearly related to *R. inornata*, differing widely from *R. inornata*, *rhina*, and *binocolata* in having the entire upper surface of the disk, except its posterior margin, covered with rather coarse prickles, which are coarsest near the mid-dorsal line, and grow finer toward the periphery. In *R. inornata*, *rhina*, and *binocolata* of this size no prickles whatever are present. In addition to the prickles, *R. montereyensis* has a series of spines on the orbital margin and an uninterrupted series of strong spines along the median line of back and tail. The anterior spine of the dorsal series occupies, as usual, a definite position between the diverging posterior ends of two series of pores which lie on either side the median line behind the occiput. The first three spines of the series are stronger than those which follow. The total number is 32, all in advance of the first dorsal fin. Area between the dorsals smooth. The orbital spines are arranged as in *R. inornata*, *rhina*, and *binocolata*. Three primary spines are distinguishable; two are in advance of the eye, one directed inward and backward, the other outward and backward; the third above the posterior margin of the orbit, directed outward and backward. These three, as well as the series of dorsal spines, doubtless here as well as in related species, are definitely formed in the late embryo, and are evident as soft papillæ beneath the integument long before the absorption of the yolk. In the type two secondary spines have been formed in the orbital series, one above the middle of the eye, the other poste-

¹ Report U. S. Fish Comm. for 1893 (1896), p. 463.

riorly above the spiracle. The presence of these secondary spines and the prickles, as well as the general texture and appearance, seem to indicate that this is a small species, with the type much older than would be the case in a specimen of the same size of *R. inornata*, *rhina*, or *binoculata*. No spines on shoulder. Lower side of disk smooth.

The disk is broadly rounded, 107 mm. long from tip of snout to posterior point of attachment of the ventral fins, 92 mm. to posterior base of pectorals; its greatest width 136 mm. Its width, therefore, is half greater than the length to posterior base of pectorals. The line joining the outer angles of disk passes through the middle of the ocellated spots and over the third spine of the dorsal series at a point midway between the tip of the snout and the posterior margin of the ventrals. The outer angle of disk is broadly rounded and the anterolateral margins slightly undulated but convex, a line from tip of snout to outer angle being everywhere included within the margin of the disk. The snout is short and convex, the tip a trifle protruding, the rostral cartilages firm, converging forward, and meeting immediately behind the tip of snout. Length of snout from front of orbit 27 mm., interorbital width of spiracle 5 mm., of mouth between lateral folds 18 mm., distance from tip of snout to nostril 23 mm. Length of tail behind disk 91 mm.

Color light brown, indistinctly mottled, and with a few scattered small dark spots. A large, conspicuous, narrow black ring on middle of pectoral base, surrounding an area of the ground color and with a dark central spot. Directly behind this, separated by half the diameter of the ring, a conspicuous small white spot. Two faint dark cross-bars on interorbital area and one on base of snout. Lower surface light, unmarked.

The species differs widely from the group typified by *stellulata* and *parmifera* by the strong rostral cartilages and the presence of a series of (primary and secondary) orbital spines. The authorities of the United States National Museum have kindly permitted the writer to reexamine the type of *Raja equatorialis*, known from a single male specimen taken near Panama. It has the upper surface of the disk without coarse prickles. All the spines are very small, those in the middle of the dorsal series, over the posterior half of the pectorals, greatly reduced, a few of them barely protruding. The anterior spine of this series is located slightly in advance of the two series of pores near median line, the second opposite middle of series, the third opposite the posterior end. Tail with a strong series of lateral spines and a few small scattered prickles. The orbital spines form a series of 12 or 13 along the superior border of the orbit and spiracle. Two or three of these are over the posterior part of the spiracle, in a straight line, and are separated by a wider interspace from the supraorbital series proper. It is not possible to identify any of these spines as

the three primary spines of related species. A line of small spines follows each rostral cartilage, a patch consisting of three or four series near lateral margin of disk opposite the eye, and the usual band of depressed spines inside the angle of the disk, somewhat irregularly arranged, but not more than two or three series wide. The sides of the occiput, the interorbital space and the snout with patches of very minute prickles, barely visible to the naked eye. Similar minute prickles form a band around inferior margin of snout. The snout is much narrower and sharper than in *R. montereyensis*, the tip protruding, the anterolateral margins distinctly concave, the anterior margin, as a whole, strongly undulated. The spiracle is very large, but little smaller than the eye. The mouth is strongly curved, the symphyseal area produced and fitting into a strong notch of the upper jaw. The teeth have strong central cusps much longer than the diameter of the base, and are arranged in definite transverse rows with wide interspaces. One can also detect series which run lengthwise of the jaw, nearly parallel with its margin. The tail is very long and slender and the dorsal fins are widely separated; the interspace slightly exceeds the length of the base of either fin, and bears on its median line seven or eight small spines. In addition to the color marks already given for *R. equatorialis*, should be mentioned the conspicuous pair of lengthwise black streaks along interorbital area, the irregular dark line below the eye and a dark spot below the spiracle. *R. equatorialis* is not very closely related to any other American species.

CHLOPSIS GILBERTI Garman.

This species has been known hitherto only from the type taken by the *Albatross* in the vicinity of Panama. Four specimens are here recorded from station 4325, near San Diego, depth 191 to 292 fathoms. They answer Garman's description in all details, save the size of the eye and the width of the interval between the gill slits. The diameter of the eye is a little less than one-third the length of the snout, and is one-tenth or one-eleventh the length of the head. The interspace between gills equals the length of the gill-slit instead of one-half that length. But both of these characters are subject to considerable variation, and both are affected by the state of preservation of the material. In each specimen, the dorsal begins almost immediately above the gill-slits, and the belly is without dark streak.

VENEFICA TENTACULATA Garman.

A single specimen 247 mm. long from tip of tentacle to vent, from station 4389, off San Diego, depth 639 to 671 fathoms. Agreeing with Garman's figure and description in all respects, except the length of the rostral tentacle, which is, in this specimen, one-half the length of the rest of the snout. The origin of the anal is below the ninety-eighth ray of the dorsal. The gape extends beyond the eye for less

than half the ocular diameter. Posterior nostril in front of upper part of eye, its distance from eye less than its length, provided anteriorly with a wide valvular fold. There are 12 pores in a series above the maxillary, the posterior under front of eye; a series of 4 around posterior border of eye; 12 along the course of the mandible, this series continued backwards in a row of 7 following the curve of the preopercle, and a minute pair on each side of median line above; upper line of snout with 7 pairs, the posterior pair just within and behind the nostrils; an eighth pair lies over the posterior border of eye, above the preopercular series. Lateral line with 53 large pores from vent to head, thence continued forward above branchial region in a series of 9 pores, the posterior of which is less than half the size of the others.

Measurements, in hundredths, of length from tip of snout (exclusive of tentacle) to vent (233 mm.). (Lengths are given exclusive of tentacle, unless otherwise stated.)

Length of head	27
Length of tentacle	6
Length of snout (without tentacle).....	12.5
Distance from tip of snout to angle of mouth.....	15
Diameter of eye.....	2
Postocular length of head.....	12.8
Depth at vent.....	5.8
Greatest depth of tail.....	6.3
Depth at gill opening.....	3.6
Internarial width.....	.9

The terminal portion of the tail is mutilated.

The species is apparently close to *V. procera* from the Atlantic, but the position of the posterior nostrils in the latter has not been described. The gape in *V. procera* is longer, and the dorsal rays less numerous, the first anal ray being under the seventy-third of the dorsal.

ALEPOCEPHALUS TENEBROSUS Gilbert.

Several specimens from the following stations:

		Fathoms.
4307..	Near San Diego.....	169-496
4317..	.....do.....	161-510
4351..	.....do.....	423-510
4429..	.....do.....	506-680
4515..	.....do.....	198-495

The description by Jordan and Evermann¹ is inadequate and contains erroneous statements, which were not found in the original description.² Thus the maxillary is contained $2\frac{2}{3}$ or 3 times in the length of the head, not $2\frac{1}{3}$ times.

¹ Fishes of North America, vol. 1, p. 453.

² Proc. U. S. Nat. Mus., vol. 14, 1891, p. 545.

XENOGNATHUS, new genus (*Alepocephalidae*).

Closely related to *Alepocephalus*, differing principally in the structure of the mouth, the premaxillary greatly expanded, forming a plate extending nearly horizontally backward, within which the deep mandible is completely received. The anal fin is much longer than the dorsal. The body is compressed, elongate, covered with cycloid scales, and with well-developed lateral line. Teeth are present in the premaxillaries, the mandible, and the front of the palatines. Opercular flap voluminous; branchiostigals 6; gill membranes separate.

Type of the genus.—*Xenognathus profundorum*, new species.

XENOGNATHUS PROFUNDORUM, new species.

Plate 14, fig. 2.

Type-specimen.—Cat. No. 75826, U.S.N.M., 525 mm. long, from station 4390, off Catalina Island, lat. $33^{\circ} 02' 15''$ N.; long. $120^{\circ} 42'$ W.; depth 1,350 to 2,182 fathoms.

Dorsal, 19; anal, 28; pectoral, 12; ventrals, 6. Pores in lateral line, 62; scales in an oblique line upwards and backwards from lateral line to middle of back, 15.

Head deeper than wide, its length one-third the total length without caudal; greatest width of head 0.43 of its length; depth at occiput 0.54; depth opposite end of opercular flap 0.61; snout depressed at tip, bounded anteriorly by a strong sharp osseous crest on the basal portion of the premaxillaries; length of snout from eye, 0.29 of head; width of snout opposite the outer ends of the terminal crest, 0.26; frontal width opposite middle of eye, 0.27; longitudinal diameter of eye, 0.22; maxillary reaching vertical from middle of eye, its length measured from tip of snout, 0.45; length of premaxillary band of teeth, 0.27, the bone extending but little beyond the last teeth; vertical depth of mandible at symphysis, 0.6, the mandible shutting completely within the premaxillaries in closed mouth, the premaxillary teeth directed horizontally inward across the inferior aspect of the mandible.

Premaxillary teeth slender, cardiform, anteriorly in a very narrow band, laterally in a single series. Mandibular teeth similar, in a narrow band or irregular series anteriorly. A single series of teeth on the front of the palatines, which overlap the vomer anteriorly, and are separated by a short distance on the median line. Vomer and maxillary toothless. Gill-rakers 3+13 on outer arch, without teeth, the longest 0.055 length of head.

Origin of anal midway between middle of caudal base and margin of opercular flap; base of anal 0.66 length of head. Origin of dorsal under sixth anal ray, its last ray under the fourth before the last of

the anal, its base 0.40 length of head. Caudal forked. Pectoral inserted below the middle of the depth, its upper ray below level of pupil; length of pectoral, 0.45 of head, scarcely reaching vertical from base of ventrals. Base of ventrals slightly nearer base of caudal than tip of snout.

Body completely invested with cycloid scales, which do not extend on the bases of the fins.

Dark brown throughout on body and fins, the head nearly black.

Only the type known.

LEUROGLOSSUS STILBIUS Gilbert.

List of stations.

		<i>Fathoms.</i>
4427..	Off Santa Cruz Island.....	447-510
4461..	Monterey Bay.....	285-357
4468..	.....do.....	32-309
4512..	.....do.....	334-530
4515..	.....do.....	198-495
4533..	.....do.....	144-293

A single scale in one specimen still attached to the middle of the dorsal region is nearly twice as deep as long, cycloid in structure, and with entire margin. There were apparently 38 scales in a series along middle of sides. The ventrals are inserted somewhat in advance of the middle of the dorsal, but little behind a vertical from origin of dorsal.

BATHYLAGUS PACIFICUS Gilbert.

Bathylagus borealis GILBERT, Rept. U. S. Fish Comm. for 1893, 1896, p. 402.

Four specimens of this rare form were obtained in better condition than any previously secured. From these it appears that the characters alleged to distinguish it from *B. borealis* from Bering Sea are unreliable. The depth of body in these specimens is contained from $5\frac{1}{2}$ to $5\frac{1}{2}$ times in total length without caudal. The distance from front of anal to base of caudal exceeds the length of the head and is contained $3\frac{1}{2}$ to $3\frac{1}{2}$ times in total length without caudal. The front of dorsal is midway between the insertion of adipose fin and the tip of the snout, or slightly nearer the latter. Dorsal, 10 or 11; lateral line, 40. The last two rays of the dorsal and anal are closely apposed and might be considered a single ray split to base.

MYCTOPHUM AFFINE (Lütken).

Myctophum nitidulum GARMAN, Mem. Mus. Comp. Zoöl., vol. 24, 1899, p. 266, pl. 56, fig. 3.

Rhinoscopelus oceanicus JORDAN and EVERMANN, Bull. U. S. Fish Comm., vol. 22, 1902, p. 168.

Myctophum margaritatum GILBERT, Bull. U. S. Fish Comm., vol. 23, pt. 2, 1905, p. 596, pl. 68, fig. 2.

Here recorded for the first time from the California coast, a single young specimen having been taken at the surface at station 4392,

off Santa Catalina Island. The anal photophores are 8+5 on one side, 8+6 on the other. The species is generally distributed throughout the warmer parts of the Pacific Ocean, the nearest record to the California coast having been lat. $27^{\circ}50'N.$; long., $145^{\circ}45'30''W.$ (type of *M. nitidulum* Garman), and lat. $28^{\circ}13'42''N.$; long., $145^{\circ}44'W.$ (*M. margaritatum* Gilbert).

The Pacific form has been compared with one of Lütken's types from lat. $8^{\circ}44'N.$, long. $21^{\circ}W.$, and with numerous specimens from the Atlantic coast of the United States. The alleged differences seem to be due wholly to inaccuracies in current figures and descriptions of the Atlantic form.

The type of *R. oceanicus* is described as having 7 antero-anals. Doctor Evermann informs me that the cotype taken at the same station has the anal photophores 10+5.

TARLETONBEANIA CRENULARIS (Jordan and Gilbert).

Two young specimens 28 and 30 mm. long were taken at the surface at station 4386, midway between San Diego and San Clemente Island.

Direct comparison has been made between the types of *T. crenularis* and *T. tenua*, with the result of establishing the identity of the two forms. The alleged difference in form is due to the distortion of the type-specimens, neither of which is in perfect condition. The alleged discrepancy in number of anal photophores is due to inaccuracy in the description of *T. crenularis*, the type having 10+4 anals and 1 precaudal, while the type of *T. tenua* has 11+4 anals and 1 precaudal. The statement of the describers of *T. crenularis* that there are 21 pairs of phosphorescent spots between front of anal and base of caudal can be accounted for only on the assumption that the authors supplied spots to fill the gaps between the two anal series and between the posteroanals and the precaudal.

The species has been correctly assigned to the vicinity of *Myctophum*. It differs from all species of that genus in the absence of pores on all but the first 2 or 3 of the lateral line scales, in the constant presence of a single precaudal, 6 thoracics and 6 ventrals, instead of 2 precaudals, 5 thoracics and 4 ventrals. In addition, luminous areas on caudal peduncle are wholly wanting, the dorsal is posterior in position and the scales are crenulate.

As current accounts of the species are more or less conflicting and misleading, the following description is offered:

Dorsal, 13; anal, 18; pectoral, 13; ventral, 8 (an outer rudimentary concealed ray can be made out in the young); scales in midlateral series, 48 or 49.

With much the appearance of *Rhinoscopelus*, the caudal peduncle long and slender, the snout slightly protruding beyond the mouth in the young, apparently not protruding in adults. Mouth large,

maxillary slender, not widened at tip, extending far behind eye nearly to preopercle. Eye very large in adults, smaller in young as usual in this group. Preopercle little oblique. Gill-rakers strong, the longest 0.6 the diameter of eye, 6+11 in number.

Dorsal posterior in position, midway between tip of snout and base of caudal or slightly nearer the caudal, the middle of the dorsal vertically above the third or fourth anal ray. Adipose dorsal over the last anal rays. Pectoral inserted low, its upper rays on level with lower margin of orbit, extending beyond base of ventrals, the latter not reaching the vent. The caudal is gently forked, not rounded as represented by Goode and Bean.¹

Scales in adults crenulate, those along midlateral series weakly, those along back most strongly incised. In the young the scales appear to have entire edges. Scales of midlateral series much deeper than the others, the first three or four of them perforated and containing tubes of the lateral line, all others of the series without trace of tubes.

Photophores.—A minute preocular on lower anterior orbital margin below level of nostril, and a minute supraocular on upper orbital rim vertically above posterior margin of pupil; both of these obscure in adults. Mandibular photophores 3, opercular 2, in their usual relations, the lower opercular spot immediately behind posterior end of maxillary, very small, becoming obscure in adults. Pectorals 3, the suprapectoral low, wholly covered by the overlapping subopercle, in advance of the upper pectoral rays and a little below their level; upper infrapectoral immediately in advance of the lower pectoral rays, lower infrapectoral in a line joining the upper infrapectoral and the first thoracic, a little behind the second thoracic. Thoracics 6, the first pair almost in contact, placed vertically below the lower opercular spot, succeeding pairs progressively more widely separating, the two series regularly diverging backwards, the last pair in advance of outer ventral rays; the second interval (between second and third pairs) the longest, first interval but little shorter, the fourth the shortest, the third and fifth equal. Supraventral low, vertically above first ventral pair, on a level with middle of pectoral fin. Ventrals 6, the first pair nearly in contact on median line, nearer together than the bases of ventral fins; succeeding pairs much farther from midventral line, each series forming a gentle curve with the convexity outwards; interval between first and second pairs longest, the others about equal. Supraanals 3, somewhat angulated, the angle varying in different individuals, but always evident. Uppermost supraanal but little below the lateral line and slightly in advance of the vertical from the first anal pair, the second vertically above first anal ray, the lowest below and in advance of

¹ Oceanic Ichthyology, pl. 28, fig. 105.

the second, slightly behind vertical from sixth ventral pair, separated from the middle spot by an interval equal to those separating those of the ventral series. In 7 specimens, including the types of *crenulata* and *tenuis*, the anteroanals vary from 10 to 11, the posteroanals from 3 to 5. The posterolateral is above or a little behind the last anteroanal, and but little below the lateral line. The last anal ray is about opposite the first posteroanal. The single pair of precaudals almost in contact below, placed immediately in advance of the rudimentary rays of lower caudal lobe.

Back brownish, rest of head and body silvery, the posterior margin of each scale marked in adults by a curved series of short radiating hair lines of black pigment.

LAMPANYCTUS LEUCOPSARUM (Eigenmann).

Apparently the most abundant deep pelagic species along the California coast. Many specimens were secured, all of them typical of *leucopsarum*, with no indication of an approach to the closely allied *L. nannochir*. The latter species seems to be more northerly in its distribution, the statement made by the present writer¹ to the effect that *L. nannochir* had been taken in the Santa Barbara Channel being an error. Both *leucopsarum* and *nannochir* are found in Bering Sea, where *nannochir* is the most abundant, and both extend southward as far as the northern part of California. But in the southern part of California, south of San Francisco, only *leucopsarum* has as yet been taken, and in this region it is remarkably abundant.

The general coloration is lighter than in *nannochir*, the middle of sides always grayish silvery. The fins are translucent, or faintly pigmented, the caudal alone having a broad blackish bar at base, from which conspicuous dusky lobes extend into the basal portion of the corresponding lobes of the caudal fin. The ventrals are translucent, while in *nannochir* they are blackish, with a median light area.

Photophores always golden in color. In all specimens from the present collection there are 4 precaudals, and in all but 3 specimens the anals are 6+7 in number (the anterior group varying to 7, the posterior to 6 or 8 in the 3 specimens mentioned). Ventral photophores 4, supraanals 3 (4 in one specimen). The species is thus more constant in the southern part of its range than it is farther north, where the anteroanals are nearly evenly divided between 6 and 7, and the posteroanals between 7 and 8, where the ventrals occasionally vary to 5 and the supraanals to 2 or 4. The tracts of luminous scales on the upper and under sides of caudal peduncle are constantly longer than in *nannochir* and the "scales" more

¹ Report U. S. Commissioner of Fisheries, 1896, p. 399.

numerous, there being 6 or 7 in the upper tract (5 in 2 specimens) and 8 or 9 in the lower.

The deeper caudal peduncle, larger eye, and firmer texture also characterize this species; but, above all, the yellow photophores and the number (4) of precaudal photophores, it being now shown through recently acquired material that in *nannochir* the photophores are claret color in life, and the number of the precaudals is normally 3.

List of stations.

		<i>Fathoms.</i>
4307	Off San Diego.....	169-496
4327	.....do.....	263-330
4341	.....do.....	188-323
4368	.....do.....	240
4412	Off Catalina Island.....	265-274
4423	Off San Nicolas Island.....	216-339
4424	.....do.....	581-594
4484	Off San Miguel Island.....	270-281
4435	.....do.....	274-287
4461	Monterey Bay.....	285-357
4468	.....do.....	32-309
4512	.....do.....	309-530
4515	.....do.....	198-495
4527	.....do.....	183-337
4529	.....do.....	780-799
4533	.....do.....	144-293
4536	.....do.....	1,006-1,041
4538	.....do.....	795-871
4539	.....do.....	465-609
4540	.....do.....	389-551
4541	.....do.....	381-633
4542	.....do.....	331-677
4544	.....do.....	724-1,000
4545	.....do.....	700-900
4547	.....do.....	1,083

LAMPANYCTUS REGALIS (Gilbert).

Myctophum regale GILBERT, Proc. U. S. Nat. Mus., vol. 14, 1891, p. 7.

As current descriptions of this species are incomplete and faulty, especially as regards the distribution of the photophores, additional details are here given, based on newly obtained material and verified on the type.

Measurements in hundredths of length without caudal (153 mm.; specimen from station 4407):

Length of head, 28; diameter of eye, 4.8; length of snout, 5.8; interorbital width over middle of eye, 9; length of longest gill-raker, 4; orbits, 8; length of maxillary, 21.3; distance from orbit to preopercular angle, 16.7; greatest depth of body, 20; least depth of caudal peduncle, 11; distance from snout to dorsal, 47; to adipose fin, 76; to ventrals, 44.5¹; to anal, 59; base of adipose fin, 3.2; height at posterior margin of adipose, 6; length of pectoral, 11.5; length of ventral, 14.5; length of dorsal base, 18; of anal base, 21. Dorsal, 15, or the first a minute rudiment, 16; anal, 18 or 19; ventral, 9, the outer ray short and simple; pectoral, 12. Scales in lateral line 37 or 38, 3½ rows between lateral line and base of dorsal.

¹ Frequently less, 41 or 42.

Gill-rakers slender, 4 + 9, with one rudiment above, three below.

Eye small, shorter than snout; maxillary long, but not reaching the anterior margin of the very oblique preopercle; maxillary little widened at tip, scarcely wider than the dentigerous premaxillaries; vomerine teeth in two widely separated patches; palatine bands broad, elliptical, nearly half length of premaxillaries.

Body elongate, with deep caudal peduncle. Ventrals inserted in advance of origin of dorsal, the latter nearer tip of snout than caudal; pectoral well developed, but slender and pointed, none of the rays filamentous, the third, fourth, and fifth the longest, reaching to or nearly to base of ventrals. Ventrals reaching origin of anal. First anal ray under the ninth or tenth of the dorsal. Adipose fin unusually large, over last anal rays.

Scales caducous, those in lateral line enlarged, much deeper than the others.

General color blackish, including the rays and membranes of all the fins; ventrals with a distinct whitish blotch on inner rays.

Photophores.—No distinct antorbitals can be detected in any of our specimens, but smaller individuals would probably exhibit them. In none of our specimens is the integument of the head perfectly preserved; enough remains, however, to show that the cheeks, sub-orbital region, snout, and vertex are covered with extremely numerous minute luminous organs, which seem to be present also on the opercles and are perhaps generally distributed on other parts of the head. On the anterior part of the cheeks, they are present in definite oblique somewhat wavy lines. A somewhat larger luminous body is present on lower posterior portion of cheeks. The usual photophores below the preopercle are present, but like those on the branchiostegal membranes are poorly developed and obscured by the black pigmentation of the parts. Photophores on body very small, scarcely more than half the size of those in *L. ritteri*, resembling those in *L. niger* and *L. macropterus*.

Suprapectoral immediately below lateral line; upper infrapectoral immediately in front of upper pectoral ray and slightly below it, the lower infrapectoral below and behind the upper, the three pectoral spots nearly in line. Thoracics 5, the fourth elevated, on level of upper pectoral rays, a little behind vertical from third pair of thoracics; spots of first three pairs about equally distant from median line, those of fifth pair very widely separated, in front of outer ventral rays; second interspace shortest, the first longest. Supraventrals vertically above ventral fin, on second scale below lateral line, high above the level of the anterior supraanals, its distance from lateral line half or slightly more than half its distance from ventral fins. Ventrals 4, first pair behind inner ventral rays and nearest the median line, the second pair most divergent, the second

to fourth pairs forming gently converging lines, the fourth pair at the sides of vent and a little anterior to it; first interspace shortest, the third longest. Supraanals angulated, the upper in contact with the lateral line, vertically above base of first anal ray, the middle pair above the vent or slightly behind it, about midway between lateral line and lower profile, the anterior pair horizontally in front of middle pair, or a trifle lower, just in advance of vertical from third ventral pair. Anteroanals 8, the last pair elevated, in line joining the seventh and the posterolateral, halfway between the two or a trifle nearer the seventh pair; all but the eighth pair, form a high arch with its concavity toward the anal base, the first pair much nearer anal base than the second, the third still farther diverging, the remaining pairs again gradually approximating anal base, the seventh pair over the fifth before last anal ray. Posterolateral in contact with lateral line. Posteroanals 7 or 8. Precaudals 4, the lower 3 forming a direct continuation of the anal series, there being sometimes a short interruption but frequently none; the intervals between the precaudals usually shorter than those of the anal series, the three forming an arch at base of the lower caudal lobe, the third noticeably elevated; last precaudal on the lateral line. A patch of 3 overlapping luminous scales on back of caudal peduncle and 4 to 7 below.

Several specimens, ranging in length from 63 to 190 mm., were obtained with the trawl at the following stations:

4317	Off San Diego.....	Fathoms. 161-510
4406	Off Catalina Island.....	650
4407	.....do.....	334-600
4423	Off Santa Barbara Island.....	339-216
4428	.....do.....	764-891
4512	Off Monterey.....	469-334
4513	.....do.....	456-389
4516	.....do.....	718-756
4540	.....do.....	551-350

LAMPANYCTUS RITTERI, new species.

Plate 15, fig. 3.

Type-specimen.—Cat. No. 75807, U.S.N.M., 120 mm. long to base of caudal, about 142 mm. total length; from station 4513, Monterey Bay, 389 to 456 fathoms.

Measurements in hundredths of length to base of caudal: Length of head, 26.6; length of snout, 4.8; diameter of eye, 5.3; interorbital width, 7; length of maxillary, 19; distance from posterior angle of cheeks to orbit, 12.5; length of longest gill-raker, 4; greatest depth of body, 20; depth at adipose fin, 14; least depth of caudal peduncle, 12; distance from snout to front of dorsal, 46.5; length of dorsal, 15.5; longest dorsal ray, about 20; distance from snout to ventrals, 39; to anal, 55; to adipose fin, 75; length of pectorals, 13; of ventrals, 14; of anal base, 12.

Dorsal 14, the last ray cleft to base; anal 18, the last ray divided; pectoral 12; ventral 9, the outer ray a short simple rudiment. Lower caudal lobe preceded by 7 inarticulate, spine-like rays, upper lobe with 6. Thirty-eight scales in lateral line, the 18th covering the upper supraanal photophore, the 26th scale covering the posterolateral.

Elongate, with deep compressed caudal peduncle, the latter of nearly equal depth throughout; mouth oblique, the maxillary scarcely widened at tip, not wider than the exposed portion of the premaxillary, which reaches the angle of the mouth and is everywhere denticular; snout short, acute, the premaxillaries anteriorly on the level of middle of orbit, the mandible slightly protruding; both jaws with broad bands of short teeth of uniform length, mostly disposed on the outer exposed surfaces of the bones; vomer with two short patches of teeth, separated by a wide interval; palatine patches wide, extending along the anterior two-thirds of the premaxillaries. Gill-rakers slender, 1 rudiment and 4 developed above the angle of the first arch, 1 or 2 rudiments and 10 or 11 developed below the angle. Eye small, anteriorly placed, half the maxillary behind its posterior border. Upper portion of opercle marked with concentric lines, and with weaker radiating lines which diverge from the joint; subopercle with lines radiating backward and downward.

Scales mostly lost; the few remaining extremely thin and flexible with entire edges, those of the lateral line much higher than the others, but largely concealed by overlapping scales above and below; $3\frac{1}{2}$ series between lateral line and base of dorsal.

Third dorsal ray midway between snout and rudimentary caudal rays; the middle of the length, exclusive of caudal, is under the fifth dorsal ray. Ventrals inserted well in advance of dorsal, about midway between front of eye and last anal ray, the longest ventral ray extending slightly beyond the vent. Pectorals of moderate width, their tips reaching base of ventrals. First anal ray slightly behind vertical from middle of dorsal base. Adipose fin small, inserted over the posterolateral, a little in advance of last anal ray.

Photophores of normal size, much larger than in *regale*. When uninjured, the majority of them are crossed by a curved pigment band, similar to that in *Diaphus*, but lacking the definiteness there found. Antorbital small, below axis of eye, detected with difficulty in adult specimens. A single photophore near posterior angle of cheeks, above terminal portion of maxillary. The usual spots under preopercular margin and on gill membranes. A small humeral spot present at upper end of opercular cleft. Suprapectoral on the first scale below lateral line, its distance from lateral line one-fourth its distance from pectoral fin; upper infrapectoral above middle of pectoral base but below its uppermost rays; lower infrapectoral vertically below the upper, slightly in advance of a line joining the other

two. Thoracics 5, the fourth elevated, on a level with upper pectoral rays or slightly above them, a trifle behind vertical from third thoracics; first, second, third, and fifth pairs of thoracics forming gently diverging lines, the fifth less widely separated than in *L. regale*, not opposite the outer ventral rays; second and fourth thoracic interspaces equal, the first one-third longer. Supraventral vertically above ventral base, midway between ventral base and lateral line, very little above the line joining the two lower supraanals. Ventrals 4, the first pair nearest the median line, at base of inner ventral rays, those of second pair most widely separated, forming with the third and fourth pairs lines gently converging to the sides of the vent. Supraanals angulated, the first and second in a line parallel with lateral line, a little nearer the ventral outline than the lateral line, the first over or slightly in advance of the third ventral spot, the second vertically above the first anal ray; third supraanal in contact with the lateral line, above the interspace between first and second anals. Anteroanals 8, the first 7 forming a weakly curved line with the concavity downward, the eighth abruptly elevated, in a line joining the seventh and the posterolateral, but constantly a little nearer the seventh. Posterolateral in contact with lateral line, a little in advance of last anal ray. Posteroanals forming with the lower precaudals an unbroken series of 11 photophores; the last precaudal abruptly elevated, at the end of the lateral line; the next to the last precaudal a little elevated, vertically below the last. While there is no interruption to mark off the lower precaudals from the posteroanals, the last three of this series lie above the caudal rays and are a little more widely spaced. The total number of precaudals may therefore be taken as 4, a number agreeing with that found in other closely related species in which the series is broken. In one specimen of *L. ritteri*, evidently abnormal in this respect, 4 smaller photophores are crowded above base of lower caudal lobe. A short luminous patch on back of caudal peduncle, occupying in the type one-third the distance from caudal to adipose fin, consisting of 4 luminous scales; a similar patch below occupies nearly the entire length of caudal peduncle, containing in the type 8 luminous scales.

General color black, including the mouth and lining of gill cavity. Fins dark at base, none of them black, all marked by fine wavy lines formed by black pigment along lines of articulation of the rays.

This species is very closely allied to *L. regale*, with which it is found associated. From *L. regale* it differs:

(1) In the much larger photophores, these being very small in *regale*.

(2) In the absence of the extremely numerous minute photophores on cheeks.

(3) The lower supraventral, which in *regale* is near lateral line and much above the level of the first supraanal.

(4) The posterior position of the upper and middle supraanals, the upper in *regale* being in advance of first anal ray.

(5) The lower last anteroanal, this in *regale* half way between the preceding anal and the posterolateral.

(6) The lighter fins, the fin membranes being all black in *regale*.

(7) The much smaller adipose fin.

(8) The more anterior insertion of ventrals.

(9) The shorter head.

Paratypes were secured from the following stations:

		<i>Fathoms.</i>
4400	Off San Clemente Island.....	500-507
4403	.....do.....	599-505
4539	Monterey Bay.....	551-350

A single very young specimen was also secured by Doctor Ritter, off La Jolla, near San Diego, at a depth of about 400 fathoms.

CHAULIODUS MACOUNI Bean.

List of stations.

		<i>Fathoms.</i>
4393	Off Santa Catalina Island.....	2, 113-2, 259
4405	Off San Clemente Island.....	645-704
4515	Monterey Bay.....	718-756
4544	.....do.....	724-1,000

The above depths have no significance, as the species may well have been captured as the open-mouthed trawl was being hauled to the surface. It has frequently been taken in nets sent down to only 300 fathoms, and is undoubtedly to be reckoned among the deep pelagic forms. In one specimen the stomach contents consisted of *Sagitta* and other pelagic organisms.

C. macouni is evidently distinct from *C. sloani*, *C. barbatus*, and *C. pammelas*, having a larger number of ventral photophores than either of these species. According to Brauer¹ *C. sloani* has 23 to 26 ventral organs, usually 23 or 24, while *C. barbatus* has 22 or 23 and *C. pammelas* 20 or 21. In *C. macouni* there are 26 to 29 photophores between the front base of ventrals and the front of anal fin, usually 27 or 28. This number agrees with that given by Garman for *C. dentatus* (29). But the latter species has a wider pectoral (14 rays), a longer anal (13), and a larger number of photophores from front of anal to caudal (14) than we have found in any specimen of *C. macouni*. On the other hand, the California species seems to agree in every respect, both as regards proportions of parts and the

¹ Die Tiefsee Fische, 1906, p. 41.

number and distribution of photophores with *C. emmelas* Jordan and Starks, from Japan.¹

In *C. macouni* the branchiostegal rays vary in number from 18 to 20; the anal rays are 11 or 12 and the pectoral rays 11 or 12 in number, 11 predominating in both fins. The lower series of luminous organs are 8 + 20 to 22 + 26 to 29 + 11; the upper series, 17 to 20 + 25 to 27. Length of head, fifteen one-hundredths of total length without the caudal fin; depth, 13; distance from front of base of pectorals to base of ventrals, 26; from ventrals to front of anal, 41; from tip of snout to front of dorsal, 23½.

In *C. emmelas* the luminous organs are present as follows: Lower series, 8 + 20 to 22 + 26 to 29 + 11; upper series, 17 or 18 + 26 or 27.

ZASTOMIAS, new genus (*Stomiidae*).

Body naked; mouth very large, much as in the Malacosteids, the maxillary reaching almost to mandibular joint, the latter extending beyond the opercular border and well beyond the base of the pectorals. Long slender nondepressible fangs in the front of the mandible, overlapping the opposite pair, or fitting into groves within the upper jaw. Maxillary toothed throughout, the posterior teeth small, retrorse. Tongue and palatines with slender teeth, vomer naked. Barbel very long, with enlarged tip. Pectorals inserted very low, close together near the median line, the anterior ray specialized, greatly thickened and probably detached, though the total absence of the pectoral membrane makes it impossible to determine this point with certainty. All the pectoral rays are filamentous. Ventrals well behind the middle of the length, near together on the ventral surface, dorsal and anal far back near the tail, nearly equal and opposite. Caudal forked. Two large luminous organs on the head, two series of small organs along lower side of trunk and tail, the entire surface of head and body thickly beset with minute luminous bodies, much as in *Opostomias*. Distinguished from all other genera by the very large mouth, the unequal nondepressible fangs, the palatine teeth, and the very numerous minute, lumincus organs.

Type of the genus.—*Zastomias scintillans*, new species.

ZASTOMIAS SCINTILLANS, new species.

Plate 15, fig. 4.

Type-specimen.—Cat. No. 75808, U.S.N.M., 72 mm. long, from station 4540, Monterey Bay, depth 389 to 551 fathoms.

Dorsal, 21; anal, 27; ventrals 4 on one side, 6 on the other, without apparent injury; pectorals, 1 + 3.

Measurements in hundredths of length without caudal: Length of head to opercular margin, 27; length of snout, 7.8; frontal width

¹ Bull. U. S. Fish Comm., vol. 22, 1902, p. 579.

over middle of orbits, 7; diameter of eye, 5; distance from tip of snout to end of maxillary, 26; to mandibular angle, 27; length of barbel, 61; greatest depth at nape, 17; least depth, 3; distance from tip of snout to base of pectorals, 24; to base of ventrals, 58; to origin of dorsal, 78; to origin of anal, 79; length of filamentous pectoral rays, 18; longest ventral ray, 19; length of base of dorsal, 14; of anal, 17.

Body deepest at the nape; occiput and interorbital space strongly arched transversely, the eye about equidistant from profile and from mouth; anterior profile strongly decurved from the occiput to the very narrow rounded snout. Nostrils without tubes, in a horizontal line in front of eye.

Mandible with a strong anterior pair of fangs which in the closed mouth lie in shallow grooves in the anterior surface of the snout and upper jaw. A second somewhat shorter pair also lie outside the premaxillaries, when the mouth is closed, in deeper grooves or sockets beneath the posterior nostrils. Behind this five pairs of shorter canines of about equal length, evenly spaced along the jaw. Teeth in premaxillaries agreeing in number and arrangement with those in the mandible, but all shorter than the shortest of the mandibular series; the posterior premaxillary fangs are retrorse. Maxillary firmly joined to premaxillary, its entire length beset with minute retrorse teeth. Palatine teeth small, in a single series. Eye small, its diameter less than length of snout, its anterior margin in advance of the middle third of the jaw. Barbel very long and slender, reaching well beyond base of ventrals, provided with a smooth club-shaped tip.

Dorsal and anal opposite and nearly equal. Caudal moderately forked. Ventrals inserted low, midway between base of caudal and middle of cheek, the elongate tips nearly reaching the vent.

Color black. Head, body, and fins thickly beset with minute luminous bodies, many of which are arranged in vertical intersegmental lines. Two lengthwise series of slightly enlarged spots on lower part of sides, the upper series usually widely spaced, but with occasional groups of four or five closely crowded spots occupying definite positions. The integument has suffered to such an extent that a detailed description of the two series is impossible. A narrow curved luminous organ on the lower margin of the anterior half of the eye and a larger oval spot behind it on the cheek.

Only the type known.

IDIACANTHUS ANTROSTOMUS Gilbert.

One specimen from station 4415, off Santa Barbara Island, depth 131 to 638 fathoms.

COLOLABIS BREVIROSTRIS (Peters).

Several young specimens, 15 to 55 mm. long, were taken in the surface tow at the following stations:

4308	Off San Diego.....	Surface.
4313	.....do.....	Do.
4385	.....do.....	Do.
4389	.....do.....	Do.
4390	Off Santa Catalina Island.....	Do.
4392	.....do.....	Do.

A specimen of this species about 10 inches long has recently been taken by us off the western coast of Vancouver's Island, thus well to the northward of its reported range.

MELAMPHAËS CRISTICEPS Gilbert.

=? *Melamphaës nigrofulvus* GARMAN, 1899, p. 64, pl. D, fig. 2.

Hitherto reported from off the coast of Washington, and from Monterey Bay, California. A specimen in the present collection is from station 4403, off San Clemente Island, southern California, 505 to 599 fathoms.

The length from tip of snout to base of caudal is 84 mm. The following measurements are given in hundredths of this length: Length of head, 41; diameter of eye, 6; length of snout, 11; length of maxillary, 18; longest gill-raker, 7; distance from tip of snout to posterior line of occiput, 26; to front of dorsal, 49; to front of anal, 64; to base of ventrals 42; to base of pectorals, 41; length of dorsal base, 26; of anal base, 11.7; length of pectorals, 32; of ventrals, 18; depth of body, 30; least depth of caudal peduncle, 11.5; length of caudal peduncle, from base of last anal ray to first caudal ray, 22.5; from last dorsal ray to first caudal ray, 26.

Dorsal, III, 13; anal, I, 9; pectoral, 15/15; ventrals, I, 7; lateral line 23 or 24, counting from posterior opercular margin; gill-rakers 9+20, long, broad at base, tapering to a slender tip, weak and flexible.

The median spine on snout is directed upwards and slightly backwards; the skull is of firm cartilaginous texture, especially in the occipital and preocular areas. The mouth is oblique, the maxillary extending beyond the orbit.

The ventrals are inserted below or very slightly behind the base of pectorals.

The first dorsal ray is barely in advance of the middle of the length (excluding caudal). The first anal ray falls below the sixth before the last of the dorsal; last dorsal ray midway between the first ray of dorsal and the first of caudal.

M. unicornis Gilbert from the Hawaiian region has the dorsal, anal, and ventral fins more posteriorly inserted, their distances from tip of

snout being 55, 69, and 46 hundredths, respectively. The width of head and interorbital area are appreciably less, and the caudal peduncle is more slender. *M. nigrofulvus* Garman from the vicinity of Panama, is very similar, but has apparently a slightly shorter maxillary, which does not extend past the orbit, and also slightly smaller scales. But the two may be identical.

MELAMPHAËS BISPINOSUS, new species.

Plate 15, fig. 5.

Type-specimen.—Cat. No. 75809, U.S.N.M., 75 mm. long, from station 4382, off the Coronado Islands near San Diego, 642 to 666 fathoms.

Dorsal II, 11; anal I, 8; pectorals, 13 in each fin; ventrals I, 7 on each side. Scales fallen, the pouches indistinct, probably 23 to 25 in number. Gill-rakers 9 + 15 in number, the one in angle included with the upper set.

Length of head, 43 hundredths of total length without caudal; length of snout, 12.5; diameter of eye, 5; least interorbital width, 16.5; length of maxillary, 16; length of longest gill-raker, 6.5; depth at occiput, 28; greatest width of head, 20; greatest depth of body, 30; least depth of caudal peduncle, 12; length of caudal peduncle from last anal ray, 26; distance from tip of snout to base of pectoral, 41.5; to ventrals, 40; to front of dorsal, 47; to front of anal, 63; length of dorsal base, 23.5; of anal base, 10; length of pectoral fin, 29.

Snout rather long, gently declivous, $2\frac{1}{2}$ times the diameter of the eye; mandible scarcely protruding, without symphyseal knob; cleft of the mouth oblique, the maxillary slightly passing the middle of the eye, a trifle less than the interorbital width; posterior margin of preopercle nearly vertical, the anterior crest with two or three teeth at angle, the lower limb with well-marked diverging striæ, forming a continuous series with those on the interopercle; opercle with a strong ridge running upwards and backwards, and one downwards and backwards, continued across the subopercle; the upper portion contains a set of strong diverging striæ; subopercle produced upwards and backwards to form a long pointed projection distinct from the posterior margin of the opercle. Occipital region of the skull firm and cartilaginous in texture; no cartilaginous area about the orbit; crests thin and papery, high, but less so than in *P. beani*, from the Atlantic. The ridge formed on the median line by the lower mandibular crests is much lower, and the upper lateral mandibular expansions fail to meet those from the suborbitals, and thus do not conceal the maxillary; the area between the occipital crests is narrow, its width not greater than the diameter of the eye; a vertical plate in the mesethmoid replaces the spine seen in *P. unicornis* and *cristiceps*.

Origin of dorsal nearer tip of snout than base of caudal, the length of its base contained $1\frac{1}{2}$ times in its distance from first upper caudal ray; first anal ray under the fifth before the last dorsal ray, the last dorsal ray over the middle of anal base. Base of ventrals slightly in advance of base of pectorals; the pectoral fin extends beyond the base of the dorsal.

Apparently jet black in life, including the mouth and gill cavity.

M. bispinosus is apparently most nearly related to *M. beani*, with which it agrees in having but two spinous rays in the dorsal fin. It differs in the longer snout, longer slenderer head, shorter caudal peduncle and lower crests on head. A specimen of *M. beani* from the United States National Museum shows the following measurements: Length of head, 36 hundredths of total length to base of caudal; greatest width of head, 18; interorbital width, 15; length of snout, 8.5; length of longest gill-raker, 5; distance from tip of snout to occiput, 19; to front of dorsal, 49; to front of anal, 54; to base of ventrals, 33; to base of pectorals, 35; length of caudal peduncle from last anal ray, 35.

Paratypes were obtained from the following stations:

4335	Off San Diego.....	Fathoms. 500-534
4336	do.....	518-565
4382	Off Coronado Islands.....	642-666
4402	Off San Clemente Island.....	542-599

MELAMPHAËS NYCTERINUS, new species.

Plate 16, fig. 6.

Type-specimen.—Cat. No. 75810, U.S.N.M., about 80 mm. in total length (caudal fin injured), from station 4393, off Santa Catalina Island, 2,113 to 2,259 fathoms.

Dorsal, II, 12; anal, I, 8; pectorals, 14 in each fin; ventral, I, 7. Scales in 27 oblique series downward and backward, 12 or 13 scales in an oblique series from front of dorsal to front of anal.

Length of head, 38 hundredths of total length without caudal; length of snout, 11; diameter of eye, 3; least interorbital width, 10; length of maxillary, 18; depth at occiput, 28; greatest width of head, 20; greatest depth of body, 29; least depth of caudal peduncle, 10; length of free portion of caudal peduncle, 26; distance from tip of snout to pectoral, 41; to base of ventral, 43; to front of dorsal, 50; to front of anal, 71; length of base of dorsal, 23; length of base of anal, 8; distance from base of ventral to origin of anal, 28; length of pectoral, 30.

Head moderately compressed, rather thick, the circumocular crests well developed, other crests low; occipital area prominent, firm, without lateral winglike expansions; supraorbital expansions high, rather firm, overarching and largely concealing the eye; anterior and

posterior margins of orbit with winglike crests, which meet in an acute angle below; eye not surrounded by the well-developed cartilaginous plate present in some species. Eye smaller than in any other known species, but apparently perfect. Its diameter is less than a third the length of the snout or the interorbital width. Mouth large, oblique, the maxillary extending well beyond the orbit; mandible slightly protruding, without symphyseal knob; inner mandibular edges produced, the two meeting to form a low crest. Teeth subequal, in narrow bands in the jaws, the palate toothless. Gill rakers long and slender, 5+14 on outer arch, the longest nine one-hundredths of the standard length; gill laminae very short, the outer row on the first arch shorter than the width of the arch. Pseudo-branchiae reduced to 2 or 3 filaments. Branchiostegals, 8.

Preopercular margins nearly vertical, little elevated, the anterior with two weak spinous points at angle. Opercle with a vertical and a horizontal ridge, the bone marked with delicate diverging striae, with uneven surfaces.

Scales largely fallen, the few remaining with fine concentric striae. On the integument of the caudal peduncle are to be seen definite traces of the lateral line.

The origin of the dorsal is slightly nearer snout than base of caudal, the anal beginning under the next to the last dorsal ray. Ventrals inserted slightly behind the base of the pectorals. Pectorals long, extending slightly beyond the vertical from the vent, the other fins mutilated so their length can not be given. Base of pectorals oblique, extending downward and backward.

In spirits, uniform blackish brown, darker on the head; caudal fin yellowish. Buccal cavity and lining membrane of cheeks a lustrous light blue, the gill membranes, opercles, and jaws lined with brownish black.

Only the type is known.

M. nycterinus is most nearly related to *M. maxillaris* Garman, taken off the coast of Ecuador. *M. nycterinus* has a much smaller eye, a shorter maxillary, lower cephalic crests, a longer dorsal fin more anteriorly inserted, and an anal with longer base and slightly more anterior position. *M. cristiceps* has a still longer anal more anteriorly placed, much higher crests, and much larger eye, and many more gill rakers.

SCHEDOPHILUS HEATHI Gilbert.

A young specimen 33 mm. long was found in the cavity of *Pyrosoma* captured at station 4446, in Monterey Bay. Another specimen has been more recently taken by Dr. Harold Heath near Catalina Island, from the cavity of a *Salpa*.

CYMATOGASTER AGGREGATUS Gibbons.

Station 4476, Monterey Bay, 25 to 39 fathoms.

ZALEMBIUS ROSACEUS (Jordan and Gilbert).

List of stations.

		<i>Fathoms.</i>
4476	Monterey Bay.....	25-29
4492	.....do.....	26-27

HYPOCRITICHTHYS ANALIS (A. Agassiz).

List of stations.

		<i>Fathoms.</i>
4476	Monterey Bay.....	25-39
4475	.....do.....	53-85

SEBASTOLOBUS ALASCANUS Bean.

The following are distinctive characters of this species compared with *S. altivelis*:

Spinous dorsal normally XVI (rarely XV or XVII), the fin low, the outline regularly rounded, the spines increasing in length to the fourth or fifth, thence decreasing to the fourteenth, or occasionally the thirteenth, the last 2 (rarely the last 3) again lengthened. Notch between dorsals averaging deeper than in *S. altivelis*. Gill-rakers short, about half length of pupil, 6 in number on upper limb of outer arch, 9 developed and 4 rudimentary on horizontal limb. Cephalic spines all stronger; 2 well developed paroccipitals, the anterior immediately behind the upper posterior orbital rim, rarely broken up into 2 or 3 small points. Two distinct black blotches on spinous dorsal, the 2 rarely confluent, usually separated by half the length of the fin. Pectorals dusky, becoming lighter at base in the young, the basal light bar widening with age until the dark bar is confined to distal half of fin, the posterior margin usually whitish. The dark pectoral bar is crossed by narrow light vertical lines or by vertical series of light spots. Dark coloration of pectorals may wholly disappear in adults. The lining of buccal and gill-cavities is with little or no black pigment at any age. In life, this species is of a lighter more orange-red, the inside of mouth is white, only slightly tinged posteriorly, and the opercle shows a bare trace of dusky. The nasal cirrus is developed as a simple narrow tentacle.

List of stations.

		<i>Fathoms.</i>
4306	Off San Diego.....	207-497
4307	.....do.....	169-490
4322	.....do.....	110-199
4366	.....do.....	158-181
4410	Off Santa Catalina Island.....	178-195
4412	.....do.....	265-274
4421	Off San Nicolas Island.....	229-298
4462	Monterey Bay.....	161-313
4475	.....do.....	58-142
4509	.....do.....	152-286
4510	.....do.....	91-184
4522	.....do.....	130-149

SEBASTOLOBUS ALTIVELIS Gilbert.

Young individuals, 50 to 100 mm. long, can be distinguished at sight by the coloration. The opercles, gill-membranes, and the abdomen are blackish, the spinous dorsal and the ventrals uniform black, and the pectorals black, often with whitish base and a white margin. Older specimens lose much of this dark coloration, the peritoneum becoming silvery with sparse black specks, and the opercles appearing lighter owing to the thicker integuments masking the dark coloration of the lining membrane of the gill-cavity. The white margin of the pectorals and the light bar at the base widen at the expense of the black, until the latter is confined to a narrow bar on middle of fin, or may even disappear; a narrow black edging to the distal white bar develops secondarily. The terminal half of the outer ventral rays also become white. In adults, the black coloration of spinous dorsal is usually confined to a submarginal streak of nearly uniform intensity throughout, a distinct division into two well-separated blotches never occurring.

Other characteristics of the species are as follows:

Spinous dorsal normally XV (XIV to XVI), the fin higher, the outline angular, the third spine usually distinctly the longest, and much longer than any of the succeeding spines. Notch between dorsals not so deep as in *S. alascanus*, the last 1 or 2 (only rarely the last 3) spines again lengthened. Gill-rakers a little longer, 7 on upper limb of outer arch, 12 developed and 4 rudimentary on horizontal limb. Cephalic spines lower and more slender, only the posterior paroccipital well developed, the anterior either represented by 2 or 3 small points, or wholly undeveloped.

Spinous dorsal uniformly black (in young) or with a uniform submarginal streak, rarely with trace of interruption. Pectorals uniformly black with lighter base (in very young), or with black confined to a median bar, the base light, the terminal half light with narrow black margin. The black bar, where present, is uniform, not crossed as in *S. alascanus* by vertical light lines. The dark coloration of the pectorals may wholly fade in adults. Lining of gill-cavity and posterior portion of buccal cavity blackish.

The nasal cirrus develops as a flat fimbriate tentacle.

List of stations.

		Fathoms.
4306	Off San Diego.....	207-497
4307	.....do.....	169-496
4317	.....do.....	161-510
4322	.....do.....	110-199
4333	.....do.....	301-487
4335	.....do.....	518-565
4351	.....do.....	423-488
4353	.....do.....	628-640
4399	Near San Clemente Island.....	245-285
4400	.....do.....	500-507
4401	.....do.....	448-468
4402	.....do.....	542-599
4412	Near Santa Catalina Island.....	265-274
4421	Near San Nicolas Island.....	229-298
4517	Monterey Bay.....	750-766
4522	.....do.....	130-149
4530	.....do.....	755-958
4540	.....do.....	389-551
4542	.....do.....	331-456

As will be seen from this list, the species is much more abundant in southern California than *S. alascanus*, and occurs in deeper water.

SEBASTODES RHODOCHLORIS (Jordan and Gilbert).

List of stations.

		Fathoms.
4310	Near San Diego.....	71-75
4339	.....do.....	241-369
4343	Off Coronado Islands.....	55-155
4410	Off Santa Catalina Islands.....	178-195
4414	.....do.....	131-162

The specimens vary much in the length and strength of the dorsal spines, in the prominence of the occipital ridges, and in the color of the dorsal region, the green wavy lines and spots being present in some specimens and apparently absent in others. There is also a difference in the amount of black pigment in the lining of the abdomen and gill-chamber. The maxillary and mandible are largely scaled in all the specimens, and resemble in this respect *S. umbrosus*, which I am unable at present to distinguish from *S. rhodochloris*. At the same time it is possible that more than one species is represented in the specimens here noted and can be distinguished when a large amount of material is brought together.

SEBASTODES AURICULATUS (Girard).

The young specimens, 280 mm. long, were taken with hook and line at anchorage in Wilson Cove, San Clemente Island. They are both without coronal spines and exhibit faint cross-bars downwards from back. They thus agree in essential characters with the northern form which has been recognized as *Sebastes auriculatus dalli*.¹ As *S. dalli* was described from the vicinity of San Francisco and is now found to occur among the Santa Barbara Islands in company with typical *auriculatus*, the name is not available for a northern subspecies, if

¹ Jordan and Starks, Proc. Cal. Acad. Sci., 1895, p. 798.

such were found to exist. But the present form doubtless falls within the normal variation of *S. auriculatus*.

SEBASTODES MELANOPS (Girard).

Station 4497, near Santa Cruz, 11 to 14 fathoms.

SEBASTODES PINNIGER (Gill).

Station 4504, Monterey Bay, 10 fathoms.

SEBASTODES MINIATUS (Jordan and Gilbert).

Station 4441, Monterey Bay, 28-35 fathoms.

SEBASTODES ATROVIRENS (Jordan and Gilbert).

Station 4404, San Clemente Island, 15 fathoms.

SEBASTODES SAXICOLA (Gilbert).

List of stations.

		Fathoms.
4322	Off San Diego.....	110-199
4343	.....do.....	55-155
4346	.....do.....	46-50
4357	.....do.....	134-155
4365	.....do.....	130-158
4439	Monterey Bay.....	40-42
4445	.....do.....	60-66
4455	.....do.....	56-62
4464	.....do.....	51-36
4475	.....do.....	58-142
4479	.....do.....	33-45
4455	.....do.....	39-108
4510	.....do.....	91-184
4518	.....do.....	66-140
4523	.....do.....	75-108
4534	.....do.....	76-86
4535	.....do.....	54-71

SEBASTODES ZACENTRUS (Gilbert).

Plate 16, fig. 7.

Sebastes deani STARKS, Ann. Carnegie Mus., vol. 7, 1911, p. 178, pl. 29, text fig. 9, Puget Sound.

This species has been heretofore known from Southern California and is here recorded from Monterey Bay and the vicinity of San Diego. It is identical with *S. deani* from Puget Sound, and is doubtless of general distribution along the coast in deep water. The following description is drawn from the Monterey specimen, 168 mm. long.

Most nearly related to *Sebastes saxicola* Gilbert, differing most conspicuously in the following respects:

1. Gill-rakers more numerous and crowded.
2. The lower posterior angle of subopercle and the contiguous upper posterior angle of interopercle without the conspicuous spines present in *S. saxicola*.
3. No spinous tips to lobes of preorbital.

4. But two suprascapular spines, the lower anterior spine wanting in this species but present in all specimens of *S. saxicola*.
5. Second anal spine much longer and more curved.
6. Pectorals shorter, not extending beyond tips of ventrals.
7. Two conspicuous dark bars diverging backwards from orbit.
8. Dark bars on body more pronounced.

Length of head from tip of upper jaw to the margin of opercular membrane 2.7 in total length without caudal; greatest depth of body 3. Length of snout 4 in head, equal to the least interorbital width; diameter of orbit 3; length of maxillary 2.2; length of second anal spine equal to length of snout and eye.

Dorsal, XIII, 14, the last ray cleft to base; anal, III, 7; pectoral normally of 9 divided and 8 lower simple rays, the type with 9 simple rays on one side. Pores in lateral line 41 on one side, 44 on the other.

Mandible strongly protruding, entering the profile, with a well-developed symphyseal knob; maxillary broad, subtending anterior three-fourths of the pupil; interorbital region broad, nearly flat, the supraorbital ridges but little elevated, the inner pair of frontal ridges inconspicuous, diverging backwards. Preocular spine strong; supraocular ridge short, depressed, ending in a well-marked postocular spine; tympanic spine present, inconspicuous; parietal ridges sharp but low, moderately diverging, ending in slender spines. Preopercular spines flattened, triangular, the upper three directed backwards, the fourth and fifth somewhat obliquely downwards. Suborbitals extremely narrow; preorbital with two rounded lobes, the posterior lobe with an obsolescent spinous point, or with none; subopercle and interopercle with spines obsolescent or wholly wanting. Teeth in narrow bands, those on palatines in about two rows; the anterior series in the premaxillaries a trifle enlarged.

Gill-rakers long and very slender, the longest half the orbital diameter, 10 or 11 on vertical limb, 24 on horizontal limb of outer arch; no immovable rudiments present.

Scales weakly ctenoid, those on head, breast, and along bases of vertical fins much reduced in size. Bands of very fine scales accompany the dorsal spines; fine scales envelop all the other fins nearly or quite to their margins. Top and sides of head wholly scaled, including snout, preorbital, maxillary, mandible, median portion of gular membrane, and the upper 4 branchiostegal rays. Pores in lateral line corresponding with the series of scales running very obliquely downward and backward from dorsal outline to lateral line.

Spinous dorsal low, evenly rounded, the membranes not deeply incised, the fourth and fifth spines about equal, 2.4 in length of head; outline of fin not deeply notched, the thirteenth spine equaling diameter of orbit, the twelfth more than two-thirds its length. Second anal spine very long and strong, much heavier and longer than

the third, its length 1.75 in head. Caudal emarginate. Ventrals extending a trifle beyond the vent, a little overpassing the pectorals.

General color reddish in life, a narrow brown streak on middle of sides. Irregular broad dusky bars extending on basal portion of dorsal fin and downward to below lateral line; one, ill-defined under nape and first two dorsal spines, another under fifth to seventh, a third under ninth to thirteenth dorsal spines, the second and third often confluent midway between base of dorsal and lateral line, then again separating, the second barely crossing lateral line, the third extending to middle of sides; a fourth and fifth occupy the greater part of base of second dorsal, confluent below; a sixth on caudal peduncle. Two dusky streaks diverge backward from eye, each ending in a black blotch, the upper on opercle, the lower on subopercle. Top of head, snout, and tip of mandible dusky. Caudal light at base and on upper and lower rays, with dusky olive streaks running principally on the membranes. Pectorals, ventrals, and anal unmarked. Peritoneum jet black.

Measurements in hundredths of total length without caudal:

Depth of body.....	34
Depth of caudal peduncle.....	10
Length of head.....	36.5
Length of snout.....	8
Interorbital width.....	8
Diameter of eye.....	12
Length of maxillary.....	16.5
Longest gill-raker.....	5
Length of fifth dorsal spine.....	15
Length of twelfth dorsal spine.....	8.5
Length of thirteenth dorsal spine.....	12.5
Length of second anal spine.....	22
Length of third anal spine.....	17.5
Length of pectoral.....	26.5
Length of ventral.....	23
Total length without caudal, in mm.....	138

A specimen from station 4377, near San Diego, depth 127 to 299 fathoms, 157 mm. long, appears bleached and shows faint indications only of the bands on body and the dark streaks behind eye. A very young specimen from station 4543, Monterey Bay, 53 to 93 fathoms, shows perfectly the characters of the species. Other specimens are from stations 4534 and 4543, Monterey Bay, depths 76 to 299 fathoms.

SEBASTODES WILSONI, new species.

Plate 16, fig. 8.

Type-specimen.—Cat. No. 75811, U.S.N.M., 145 mm. long, from station 4518, Monterey Bay, depth 66 to 140 fathoms.

Most nearly related to *S. semicinctus* Gilbert, differing most obviously in the following respects:

1. Coloration more uniform, the very conspicuous bars of *S. semicinctus* entirely wanting on sides of body, as are also the brownish spots present in *semicinctus* on back and on dorsals and caudal.

2. The more numerous gill-rakers.

3. The absence of spines on the contiguous angles of subopercle and interopercle.

4. The arrangement of the upper three preopercular spines, which are all horizontal, the second nearer the third than the first; in *S. semicinctus* the second spine is much nearer the first than the third, and the third is directed obliquely downward and backward.

5. The presence of 6 anal rays in both type and cotype; 7 are present in *S. semicinctus* in all the numerous specimens examined.

Length of head, from tip of snout to end of opercular flap, 3 in total length without caudal; depth, 3.7; least depth of caudal peduncle, 3.8 in length of head; diameter of orbit, 3.3; least interorbital width, 5.4; length of snout, 4.2; distance from tip of snout to end of maxillary, 2.4; longest gill-raker half diameter of orbit. Gill-rakers, 13 + 30 (or 13 + 29) on outer arch.

Dorsal, XIII, 14; anal, III, 6; pectoral, 17, the lower 8 rays thickened and simple; pores in lateral line, 42 to 44, corresponding to the oblique series downward and backward from dorsal outline.

Body very slender, more so than in *S. semicinctus*, the only species which approaches it in this respect. Snout sharp, the head evenly tapering, the mandible strongly protruding, its tip extending beyond the line of upper profile, the symphyseal teeth on a projection which fits into a toothless notch above. Maxillary broad, subtending slightly less than anterior half of eye. Interorbital area flat, or rendered slightly concave by the depressed supraorbital ridges; pair of inner frontal ridges very inconspicuous. Preocular and postocular spines strong but low; tympanic spines low; parietal ridges narrow and sharp, with low, strong spines. Upper 4 preopercular spines directed backward, the fifth directed a little downward; space between second and third spines shorter than other interspaces. Preorbital with two rounded lobes, which fail to develop distinct spines. Contiguous angles of subopercle and of interopercle without spines. Two strong suprascapular spines, the lower posterior spine with an additional one anterior to its base. Palatine and mandibular bands of teeth very narrow, the latter widening abruptly at symphysis, where the teeth also increase in size.

Scales strongly ctenoid, reduced in size in head and breast, and along base of dorsal fins; accessory scales apparently not numerous. Head entirely scaled, including snout, preorbital, maxillary, mandible, gular membrane mesially, and the branchiostegal rays. A band of scales accompanies each dorsal spine; all segmented rays are invested with fine scales to their tips.

Spinous dorsal low, the spines rather strong, the membranes not deeply incised. Second anal spine decidedly longer and stronger than the third, equal in length to the first soft ray, its length equaling distance from tip of snout to posterior margin of orbit. Caudal gently concave. Pectoral rather short, barely attaining vertical from vent, the longest ray 1.2 in length of head; 17 rays are present, the lower 8 thickened and simple, the others slender, all but the uppermost divided.

Color in spirits generally light, the opercles, breast, and ventral region white. Rather faint dark bars along upper profile, one on occiput, one at beginning of spinous dorsal, one at its middle and one near its end, two under second dorsal, and one on back of caudal peduncle; a narrow brownish-red streak or line runs below the lateral line and nearly parallel with it to opposite end of anal fin. The dark blotches along base of dorsals extend on the basal portions of these fins; membranes of caudal fin with a few dark streaks; fins otherwise unmarked. Mouth and gill cavity white. Peritoneum black.

Measurements in hundredths of total length without caudal:

Depth of body.....	28
Depth of caudal peduncle.....	8
Length of head.....	33
Length of snout.....	8
Length of maxillary.....	13.5
Interorbital width.....	6
Diameter of orbit.....	11
Longest gill raker.....	5
Length of longest (fifth) dorsal spine.....	14
Length of twelfth dorsal spine.....	6.3
Length of thirteenth dorsal spine.....	9
Length of second anal spine.....	17.5
Length of third anal spine.....	13
Length of pectoral.....	27
Length of ventral.....	20
Total length without caudal, in mm.....	121

A single paratype, 105 mm. long, from station 4518, Monterey Bay, depth 66 to 140 fathoms.

I take pleasure in naming this species for Prof. C. B. Wilson, in recognition of his valuable contributions to our knowledge of the crustacean parasites of fishes.

SEBASTODES SEMICINCTUS (Gilbert).

Station 4518, Monterey Bay, 66-140 fathoms.

SEBASTODES DIPLOPROA (Gilbert).

List of stations.

		Fathoms.
4306	Off San Diego.....	207-497
4339	.....do.....	241-369
4357	.....do.....	134-155
4365	.....do.....	130-158
4413	Off Santa Catalina Island.....	152-162
4423	Off San Nicolas Island.....	216-339
4510	Monterey Bay.....	91-184
4523	.....do.....	75-108

SEBASTODES AURORA (Gilbert).

Station 4418, off Santa Barbara Island, 238-310 fathoms.

A rather wide variation is found in the size and shape of the second anal spine and in the robustness and the length of the gill rakers. The second anal spine varies from straight to strongly curved and varies in length from half to two-sevenths the length of the head. The gill rakers are sometimes slender, sometimes much more robust, and vary in length from two-fifths to four-sevenths the diameter of the eye. Similar differences are found among the type-specimens of the species.

In addition to the color already described, the species has in life 3 faint red bars, 2 under spinous and 1 under soft dorsal. Young specimens have a dark blotch under soft dorsal in the course of the red bar.

SEBASTODES INTRONIGER (Gilbert).

List of stations.

4339	Off San Diego.....	<i>Fathoms.</i> 241-369
4410	Off Santa Catalina Island.....	178-195
4418	Off Santa Barbara Island.....	238-310

As is usual in adults of this species, the second anal spine is apparently a little shorter than the third, failing to reach the tip of the third when declined, although the actual measured length of the two is about the same. In the young the second spine appears equal to the third, and its measured length is a little greater. The specimens in the present collection bear out the alleged differences between this species and *S. melanostomus*, the head being less than one-third the total length, the interorbital width less than one-fifth the length of the head, the lateral line 30 to 32 and the gill rakers one-half to two-fifths the diameter of the eye. No specimens answering the description of *S. melanostomus* have been taken by the *Albatross*, and none but the type is known. It may well prove that the alleged differences between the two species are due to errors in the original description of *S. melanostomus*, in which case the name *introniger* will give way to *melanostomus*.

SEBASTODES RUBERRIMUS Cramer.

A few immature specimens were taken at the following stations:

4460	Monterey Bay.....	<i>Fathoms.</i> 55-167
4463	.....do.....	48-111
4518	.....do.....	66-140

SEBASTODES ROSACEUS (Girard).

Station 4420, off San Nicolas Island, 32-33 fathoms.

SEBASTODES RUPESTRIS (Gilbert).

List of stations.

		<i>Fathoms.</i>
4410	Off Santa Catalina Island.....	178-195
4411	.....do.....	143-245

SEBASTODES ELONGATUS (Ayres).

List of stations.

		<i>Fathoms.</i>
4307	Off San Diego.....	169-496
4340	.....do.....	46-87
4343	.....do.....	55-155
4346	.....do.....	46-50
4349	.....do.....	75-134
4377	.....do.....	127-299
4408	Off Santa Catalina Island.....	104-117
4414	.....do.....	131-162
4460	Monterey Bay.....	53-167
4518	.....do.....	66-140

SEBASTODES RUBRIVINCTUS (Jordan and Gilbert).

Station 4417, off Santa Barbara Island, 29 fathoms.

SEBASTODES VEXILLARIS (Jordan and Gilbert).

Station 4346, off San Diego, 46-50 fathoms.

Dorsal, XIII, 13; maxillary not reaching beyond orbit; scales in lateral line, 46; second anal spine four-ninths length of head.

SCORPAENA GUTTATA Girard.

Station 4346, off San Diego, 46-50 fathoms.

OPHIODON ELONGATUS Girard.

In young specimens it is clearly seen that the first 3 anal rays are slender short spines, the first 2 of these becoming embedded and concealed in adults. These facts have been verified on immature specimens in the present collection and on a specimen 24 cm. long, in which the spines could not be distinguished without dissection.

List of stations.

		<i>Fathoms.</i>
4442	Monterey Bay.....	26-31
4459	.....do.....	13-15

ZANIOLEPIS LATIPINNIS Girard.

In 2 specimens, 150 and 152 mm. long to base of caudal, measurements in hundredths of this length are as follows: Length of head, 24 and 24.5; depth of body, 18 and 18.3; length of snout, 7 and 7; diameter of eye, 6.5 and 6.5; length of maxillary, 8.5 and 8.5; interorbital width, 4 and 3.5.

There are either 21 or 22 dorsal spines and constantly 11 soft rays. The anal has 15 or 16 rays in all specimens examined, and the pectorals 13, 14, or 15 rays.

List of stations.

		<i>Fathoms.</i>
4453	Monterey Bay.....	49-51
4473	.....do.....	54-65
4476	.....do.....	25-39
4492	.....do.....	26-27

ZANIOLEPIS FRENATUS Eigenmann.

In a specimen, 151 mm. to base of caudal, the length of head is 25 hundredths of this length; length of snout, 7; diameter of eye, 6.5; length of maxillary, 8; interorbital width, 2.8; depth of body, 18. Fin rays are as follows: Dorsal, XX-I, 13; anal, III, 17; pectoral, 15; ventral, I, 5.

A young specimen, 82 mm. long, has the interorbital space wider and less furrowed, the entire lower side of head, including gular membranes and branchiostegal rays, closely and completely scaled, and the dorsals with black blotches and bars, but without the small round black spots characteristic of adults.

List of stations.

		<i>Fathoms.</i>
4310	Off San Diego.....	71-75
4452	Monterey Bay.....	49-50
4554	.....do.....	60-80

OXYLEBIUS PICTUS Gill.

Station 4441, Monterey Bay, 26-39 fathoms.

ANOPLPOMA FIMBRIA (Pallas).

A single immature specimen, 75 mm. long, was taken at the surface at station 4518, Monterey Bay.

The 3 anterior anal rays are evidently non-articulated and spinous in the young; in adults they are imbedded and concealed and their character is difficult to determine.

Coloration of the young is peculiar. The distal half of upper pectoral rays is jet black, contrasting sharply with the white basal portion. The anterior dorsal rays and the caudal are largely black.

CHITONOTUS PUGETENSIS (Steindachner).

List of stations.

		<i>Fathoms.</i>
4420	Off San Nicolas Island.....	32-33
4453	Monterey Bay.....	49-51
4476	.....do.....	25-39
4558	.....do.....	28-40

The genus *Chitonotus* differs from *Icelinus* and *Tarandichthys* in having 3 instead of 2 ventral rays.

TARANDICHTHYS FILAMENTOSUS (Gilbert).

Pectorals 17, the lower 8 thickened, with moderately exerted tips, the upper protruding a little beyond the outline of fin. Ventrals I, 2.

List of stations.

		Fathoms.
4310	Off San Diego.....	71-75
4476	Monterey Bay.....	25-39
4543	.....do.....	53-93

TARANDICHTHYS TENUIS (Gilbert).

In addition to other striking characters in this species, it is marked by two sharp, strong spines behind the base of the supraocular filament. These are still more strongly developed in *T. cavifrons*, but are wanting in *T. filamentosus*. In adults the lower 8 pectoral rays are thickened, with moderately incised membranes, the upper of these modified rays projecting abruptly beyond the margin of the fin.

Fin rays in 7 specimens are as follows:

Specimens.....	Dorsal spines.		Dorsal rays.			Anal rays.				
	X	7	16	17	18	13	14	15	16	17
.....			1	3	3	1	1	3	1	1

Ventrals constantly I, 2.

List of stations.

		Fathoms.
4309	Off San Diego.....	67-78
4310	.....do.....	71-75
4535	Monterey Bay.....	54-71
4558	.....do.....	28-40

ICELINUS QUADRISERIATUS (Lockington).

There is a single filament near tip of maxillary, a broad one above posterior part of orbit, and a few scattered ones along lateral line. In males the anal, ventrals, and the lower pectoral rays are blackish, as well as the branchiostegal membranes.

The normal fin formula is dorsal IX, 14; anal, 12; pectoral, 16 (7+9). As in other species of *Icelinus*, the ventrals are I, 2, not I, 3, as given in current descriptions.

In 16 specimens the fin rays are as follows:

Specimens.....	Dorsal spines.		Dorsal rays.		Anal rays.			Pectorals.	
	VIII	IX	13	14	11	12	13	7+9	8+8
.....	1	15	3	13	2	11	3	11	5

The dorsal series of plates is almost universally interrupted under the end of soft dorsal. In two specimens of this collection the series is not interrupted, becoming single at the spot where the break commonly occurs.

List of stations.

		<i>Fathoms.</i>
4304	Off San Diego	25
4346	.....do.....	46-50
4347	.....do.....	55-58
4442	Monterey Bay	26-31
4452	.....do.....	49-50
4476	.....do.....	25-39
4477	.....do.....	11-19
4479	.....do.....	33-45
4487	.....do.....	18-19
4489	.....do.....	18-20
4490	.....do.....	16-20
4492	.....do.....	26-27
4519	.....do.....	27-35
4520	.....do.....	32-44
4557	.....do.....	53-54
4558	.....do.....	28-40

ICELINUS FUSCESCENS, new species.

Plate 17, fig. 9.

Type-specimen.—Cat. No. 75812, U.S.N.M., a female, 107 mm. long, from station 4418, off Santa Barbara Island, depth 260 to 310 fathoms.

Measurements in hundredths of total length to base of caudal: Length of head, including opercular flap, 39; width of head, 22; greatest depth of bony interorbital width, 3; diameter of orbit, 11.5; length of upper preopercular spine, 7; distance from tip of snout to margin of gill-membrane, 24.5; to front of spinous dorsal, 34; to front of second dorsal, 32.5; base of anal, 21.5; length of caudal peduncle, 21; longest dorsal spine, 12; longest dorsal ray, 26; longest anal ray, 13.5; length of pectoral, 24.5; length of ventral, 5; length of caudal, 19.5; greatest depth of body, 23.5; depth of caudal peduncle, 7.

Dorsal, X, 16; anal, 12; pectoral 18, the lower 10 rays thickened; ventral, I, 2, as in all other species of the genus, not I, 3, as commonly stated.

Head heavy, quadrate in cross section, the cheeks vertical; interorbital space narrow, flat, or with an obscure median ridge, its width about half diameter of pupil; nostril in a short tube; no nasal filament; a short cutaneous flap, narrowed at base and palmately cleft, posteriorly on upper orbital rim; a slender filament at end of occipital ridge, and a small flap midway between this and the supraorbital flap; a minute filament superiorly near the tip of the maxillary, and one in advance of upper end of gill-cleft; no filaments along lateral line; maxillary reaching vertical from posterior margin of pupil; palatine patches of teeth comparatively short and broad, their length about half the transverse width of the vomerine patch; nasal

spines inconspicuous, their tips acute, not cleft; upper preopercular spine rather slender, of moderate length, with three short backwardly-hooked barbs in addition to the terminal spine; preopercular margin below with three sharp spines, the upper directed backward, the lower downward and forward; no spinous point on subopercle; occipital ridge short, rugose, not ending in a free spine; sensory canals and pores on head much larger than in any other species, in accordance with its deeper habitat; the pair of pores below the mandibular symphysis open into a common pit with slightly raised margins.

Dorsal series of plates shorter than in related species, beginning under middle of spinous dorsal and ending a little in advance of end of soft dorsal, the last few plates being single; no plates on back of caudal peduncle; the dorsal row contains 20 to 22 plates. Lateral line with 36 large pores. No plates behind axil of pectorals.

Spinous dorsal low, none of the spines produced, a very short interspace between the dorsals. Pectoral wider than in other species, with 18 rays, reaching slightly beyond the vent; ventrals extremely short, not exceeding the diameter of the pupil, composed of 1 spine and 2 rays, as always in this genus; caudal broadly rounded.

Dusky olive throughout, but little lighter below; from base of soft dorsal 2 broad black bars descend to below the lateral line, the anterior sending a narrow prolongation forward from the lower anterior angle; a less evident black bar extends downward and forward from the spinous dorsal. Soft dorsal black, with a narrow white edge and a small light area at base above the interval between the black bars; 2 vertical black bars on spinous dorsal, the interval light; caudal black, with a narrow white margin; pectoral black, a lighter area at tips of upper rays and a broad light half-bar descending almost vertically from base of upper rays; the shortened lower rays are light, as are the tips of all the rays; ventrals dark. Occipital filaments black, maxillary filament white.

The paratypes are smaller than the type and much lighter in color, all the fins translucent with darker bars and mottlings, the pectoral with a large black blotch on lower half; an evident Y-shaped dark mark at base of tail.

List of stations.

4410	Off Catalina Island.....	<i>Fathoms.</i> 178-195
4418	Off Santa Barbara Island.....	238-310
4421	Off San Nicolas Island.....	229-291
4471	Monterey Bay.....	65-303

RADULINUS ASPRELLUS Gilbert.

This species has been dredged previously by the *Albatross* at numerous stations off the coasts of Washington, Oregon, and northern

California at depths of 38 to 93 fathoms. The most southerly station has been 3194, off Port Harford, California, the species having been unknown south of Point Conception. The present collection contains a specimen from station 4343, near the Coronado Islands, south of San Diego.

In their description of the species, Jordan and Evermann state that there are two opercular spines and that the interorbital space is armed with spinous plates. The opercle is, however, without ridge or spines and the greater part of the interorbital space is unarmed, its posterior portion only receiving an incursion from the postocular patch of scales. The eye is variable, its diameter contained from 2.6 to 3.3 times in the length of the head.

List of stations.

		<i>Fathoms.</i>
4343	Off San Diego.....	55-155
4452	Monterey Bay.....	49- 50
4453	.....do.....	49- 51
4554	.....do.....	60- 80

ZESTICELUS PROFUNDORUM (Gilbert).

Known hitherto from four specimens captured by the *Albatross* north of Unalaska and in the vicinity of Bogoslov Island. A single specimen is in the present collection, taken at station 4547, off Monterey, at a depth of 1,083 fathoms. The Bering Sea specimens were from 399 and 664 fathoms, indicating a very exceptional vertical range.

The fin-rays agree with the Bogoslov specimen: Dorsal, VI, 10; anal, 8; pectoral, 20; ventral, I, 2. The types from north of Unalaska had longer fins, one of these in the collection of Stanford University (No. 3025) having dorsal, VI, 12; anal, 10; pectoral, 20; ventral, I, 2. As will be noted, the ventrals have constantly 2 soft rays, instead of 3, as indicated in all previous descriptions of the species.

In the California specimen the preopercular spine is almost perfectly straight and reaches to or nearly to the margin of opercular membrane. In the cotype above mentioned the spine is less curved than is represented in the figure of the type-specimen.¹ The mouth is also slightly smaller in the California specimen, barely passing front of pupil, and the head is shorter, 2.6 in length, without caudal.

The lateral line has anteriorly two series of pores, widely separated, the upper series much smaller than the lower and approaching the lower on middle of sides, where it usually disappears. Posteriorly, the lateral line terminates in a large pore at base of caudal.

¹ Report U. S. Fish Com., 1896, pl. 27.

AVERRUNCUS EMMELANE Jordan and Starks.

Xystes axinophrys JORDAN and STARKS, Proc. Cal. Acad. Sci., ser. 2, vol. 5, 1895, p. 824, pl. 92.

Station 4520, Monterey Bay, 32–44 fathoms.

A single young specimen from the above station affords a notable extension in the range of this species, known hitherto only from Puget Sound. The fin-rays are as follows: Dorsal, X, 8; anal, 12; pectoral, 14; ventral, I 2.

Examination of the type of *Xystes axinophrys* Jordan and Starks has shown that it is based on a very young individual of *Averruncus emmelane*.¹ The only full characterization of *Xystes* is that given by Jordan and Evermann.² It is said to differ from *Averruncus* by the shorter vertical fins, the last rays of which are without posterior membrane; the progressively shortened lower rays of the pectorals; the absence of barbels or nuchal pit; the presence of a strong knife-like spine above eye. The vertical fins are, however, of the same length, the fin formula agreeing exactly (the anal fin in the type of *Xystes* having 11 instead of 10 rays). The last rays of dorsal fins are attached by posterior membrane, as in related forms, this membrane ruptured in the type of *Xystes*. The lower pectoral rays are progressively shortened in the young of all Agonoids, a specimen of *A. emmelane* from Annette Island, Alaska, 105 mm. long, showing as yet no trace of the elongation of these rays. Barbels are present in the type of *X. axinophrys*, covering the lower jaw and the branchiostegal membranes and agreeing in position with those in *A. emmelane*. A nuchal pit is present, though less developed than in adults. All the spines on head are larger in the young, but those in *X. axinophrys* agree wholly in number and position with those in *A. emmelane*. There can be no doubt of the identity of the two species.

Averruncus sterletus Gilbert should probably be referred to the genus *Agonopsis*, which appears to differ from *Averruncus* in the shorter vertical fins and the subequal jaws, the rostrum not conspicuously protruding. The latter character is not very important, and the two genera eventually may be united.

ASTEROTHECA, new genus (*Agonidae*).

Type of the genus.—*Xenochirus pentacanthus* Gilbert.³

Like *Xeneretmus* (for *Xenochirus* Gilbert, preoccupied) in all respects except that the terminal rostral plate is very small, not projecting beyond the premaxillaries, and bears 5 small spines, 3 of which diverge upward and backward and 1 projects freely at each

¹ See also Starks, Ann. Carnegie. Mus. vol. 7, 1911, p. 195.

² Fishes of North America, p. 2076.

³ Proc. U. S. Nat. Mus., vol. 12, 1890, p. 91.

lateral angle. A minute spine may also be present in the median line directed forward.

The dorsal fin is inserted normally on the eighth plate of the dorsal series, but may occasionally vary to the extreme posterior edge of the seventh (*pentacanthus*), or the anterior edge of the ninth (*alascanus*).

The genus is perhaps nearer *Bathyagonus* than *Xeneretmus*, agreeing with the latter in the character of the rostral plate, and in the number of predorsal plates. But *Bathyagonus* is from deeper water, the whole body and the fins are black or brownish black, the mandible is produced beyond the premaxillaries instead of being included within the latter, and the pectoral margin is entire—the lower rays not appreciably lengthened.

Key to species of Asterotheca.

- a*¹. Plates on cheeks thick, inflexible, immovably united with each other and with the interopercle. Lower 5 pectoral rays thickened. A single median pair of plates in front of ventrals, the remaining plates of median series unpaired (i. e., the plates of the second pair fused). Shallow water species, with comparatively thick plates and heavy spines and ridges, and the lower parts light in color.
- b*¹. Margin of preorbital not spinous. Ventrolateral series of plates smooth throughout, without spines; spines of lower lateral series weak or obsolete, this especially marked on caudal peduncle. A deep nuchal depression. Space between dorsal ridges deeply concave. Plates on cheeks, in adults, without spines or tubercles. Gill-membranes without posterior free margin. Lower pectoral rays much exerted beyond the membrane, a distinctly deeper notch between the two portions of the fin. No spine on infraorbital ridge below front of eye.....*alascana*.
- b*². Lower margin of preorbital strongly spinous in adults. Anterior plates of ventrolateral series with short but evident spines; lower lateral plates all strongly spinous, except the anterior 5 or 6, which are smooth as in other species. Plates on cheeks with minute spines. A small spine on infraorbital ridge below front of eye. Nuchal depression shallow. Space between dorsal ridges shallowly concave. Gill-membranes with a narrow free margin posteriorly. Lower pectoral rays comparatively little exerted, no conspicuous notch between the two portions of the fin.....*infraspinata*.
- a*². Plates on cheeks thin, flexible, not fused, readily movable, all (or the posterior two) bearing each a strong backwardly directed spine. Ventrolateral series of plates sharply spinous throughout, as are the lower lateral series, with the exception of the first 5 or 6. Two median pairs of plates in front of ventrals. Lower 4 pectoral rays thickened, a deep notch between the two portions of the fin. A deeper water species, with comparatively thin plates, low ridges, and delicate sharp spines; lower side of trunk and tail dark like the back; eye very large. Spines on eye-ball weak or obsolete. Palatine patches of teeth narrower than those on mandible.....*pentacantha*.

ASTEROTHECA PENTACANTHA (Gilbert).

The fin-rays in 18 specimens vary as follows:

	Dorsal spines.			Dorsal rays.			Anal rays.		
	VI	VII	VIII	8	6	7	6	7	8
Specimens.....	3	11	4	2	7	9	1	11	6

List of stations.

		Fathoms.
4306	Off San Diego.....	207-497
4307	do.....	169-496
4258	do.....	167-191
4366	do.....	176-181
4410	Off Catalina Island.....	178-195
4413	do.....	152-162
4421	Off San Nicholas Island.....	229-298
4423	do.....	216-339
4510	Monterey Bay.....	91-184
4523	do.....	75-108
4533	do.....	144-293

Genus XENERETMUS Gilbert.

Key to species of *Xeneretmus*.

- a*¹. A single upright spine on terminal rostral plate. First dorsal spine inserted on seventh plate of dorsal series, or occasionally on the extreme anterior edge of the eighth.
- b*¹. *Xenopyxis*.¹—Check below suborbital crest naked, without plates. Only one spine developed on preopercular margin. Membrane between thickened modified and normal unmodified pectoral rays not more deeply notched than between other rays. Terminal rostral plate not ending at each side in a free spine. No blue spots.
- c*¹. A single barbel at tip of maxillary. Branchiostegal membrane with a wide free fold posteriorly. Pectoral rays 14 in number, 4 or 5 of the lower rays thickened. Plates on breast reduced in adults, the anterior usually not in contact. Body slender; spines slender. No black bar on base of dorsal fins.
- d*¹. A series of 3 to 5 spines on eye-ball. Adults with a well-developed series of paired plates behind vent. Modified pectoral rays 5 (rarely 6) in number, none of them greatly produced beyond the succeeding rays, the notch shallow between modified and unmodified portions of fin. Posterior margin of gill-membranes forming a curve on middle of throat. Spinous dorsal with a narrow jet-black margin of equal width throughout. Sides without conspicuous dark blotches. Median series of plates on caudal peduncle 14 to 16 in number. Dorsals more posteriorly inserted.....*latifrons*.
- d*². No spines on eye-ball. Series of paired plates behind vent very inconspicuous. Modified pectoral rays 4 in number, the uppermost much produced beyond the succeeding rays, a deep notch between modified and unmodified portions of fin. Posterior margin of gill-membranes angulated on middle of throat. Spinous dorsal with jet-black margin, which widens anteriorly to include greater part of fin. Sides with conspicuous dark blotches. Median series of plates on caudal peduncle 17 or 18 in number. Dorsals more anteriorly inserted.....*lelops*.
- c*². Two barbels at tip of maxillary. Branchiostegal membrane posteriorly with extremely narrow free fold. Pectoral rays 16 in number, the lower 6 or 7 thickened, the fin without deep notch. Body deep; spines strong. A black bar on base, as well as on margin of dorsal fins.....*ritteri*.
- b*². *Xeneretmus*.—Check below suborbital crest with three plates. Two preopercular spines developed. Pectorals with 13 rays, the 4 lower rays thickened and produced, the membrane between ninth and tenth rays deeply notched, the notch extending about halfway to base of ninth ray. Terminal rostral

¹ *Xenopyxis* Gilbert, new subgenus, type, *Xeneretmus latifrons*.

plate more freely movable, each lateral prolongation terminating in a short free spine. Small plates present on gill membranes and on gular membrane. Gill membrane without free fold. Two maxillary barbels. Small blue spots present on head and anterior part of trunk. Dorsal fins without dark bars at base or tip. *triacanthus*.

XENERETMUS LATIFRONS (Gilbert).

The principal distinctive characters of this species have been indicated in the preceding key and in the comparison with *X. leiops*. The following may be added:

The anterior 5 or 6 plates of lower lateral series spineless; ventral series becoming spineless from 1 to 4 plates in front of origin of anal fin. Patch of vomerine teeth wide, crescentiform, the posterior margin concave; palatine bands wider than those in the jaws. Sides with faint traces only of darker bars. Inferior surfaces whitish throughout, the lower side of tail not dusky. No bright spots. Spinous dorsal with a well-defined jet-black margin of uniform width throughout. Rays of soft dorsal and caudal dusky, a narrowly elliptical patch of the membrane bordering each ray dusky in the distal half of the fins. Posterior part of buccal cavity blue-black.

As is usual in this group, there are two pairs of plates on breast in front of the base of ventral fins. In addition, there is a small unpaired plate which varies in position, being sometimes wholly posterior to the paired plates; sometimes farther forward interposed between the plates of the posterior pair.

In a young specimen 44 mm. long the breast plates are elevated centrally and bear each a short spine. The vent is more posteriorly placed than in adults, being but little in advance of the tips of the ventral fins. Beginning immediately behind the ventrals is a double series of 12 small plates, each bearing a central prominence. With increasing age the vent passes forward between these two series.

The cheeks are normally without plates; two specimens only of the many examined had each a single plate on one side below the suborbital ridge.

In 26 specimens examined the fin-rays vary as follows:

	Dorsal spines.		Dorsal rays.			Anal rays.	
Specimens.....	VI 6	VII 20	6 1	7 23	8 2	7 23	8 3

The median plates on caudal peduncle are as follows in 24 specimens:

Specimens.....	14 6	15 16	16 2
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The species was taken abundantly at the following stations:

4322	Off San Diego.....	<i>Fathoms.</i> 110-199
4356	.....do.....	120-131
4357	.....do.....	134-155
4358	.....do.....	167-191
4365	.....do.....	130-158
4366	.....do.....	176-181
4455	Monterey Bay.....	56-62
4472	.....do.....	59-71
4475	.....do.....	58-142
4477	.....do.....	11-19
4480	.....do.....	53-76
4485	.....do.....	45-109

From this list it appears that the species lives at greater depths to the southward, off San Diego, than in the vicinity of Monterey Bay. The few specimens which have been dredged on previous expeditions off the Oregon coast were also in comparatively shallow water. The rule is, however, not without exceptions. Thus at stations 2972 and 2973 of a previous expedition the species was taken in the Santa Barbara Channel at depths of 61 and 68 fathoms; and at stations 3129, 3161, 3189, 3193, 3204, 3206, and 3209 it has been taken between Point Conception and Monterey Bay at the following depths: 204, 191, 218, 160, 202, 169, and 141 fathoms.

Measurements in hundredths of length, without caudal.

	Station 4472.	Station 4455.
Length of head, including opercular flap.....	22	21
Length of snout.....	6	6
Diameter of eye.....	7.5	7.1
Interorbital width.....	2.5	2
Greatest width of head.....	12.5	12.5
Depth at occiput.....	10.5	9.5
Length of maxillary.....	6.2	6
Distance between angles of mouth.....	5	5.5
Width at axil of pectorals.....	10	10.5
Depth of body.....	11.5	11
Length of caudal peduncle.....	41.5	41
Predorsal length.....	32	31.2
Length before second dorsal.....	51	50
Preanal length.....	47.5	46
Length of first pectoral ray.....	15.5	17
Length of eighth pectoral ray.....	14	15.5
Length of ninth pectoral ray.....	15	16
Length of tenth pectoral ray.....	17	18
Length of eleventh pectoral ray.....	17.1	17.5
Length of fourteenth pectoral ray.....	9	10
Length of ventrals.....	9	9
Length of caudal.....	11	11.5
Longest (first) ray of second dorsal.....	13	14
Total length in millimeters.....	136	158
Length to base of caudal, in millimeters.....	123	142

XENERETMUS LEIOPS, new species.

Plate 17, fig. 10.

Type-specimen—Cat. No. 75813, U.S.N.M., 176 mm. long, from station 4410, off Catalina Island, southern California, depth 178 to 195 fathoms.

Very close to *X. latifrons*, differing in the coloration, the more slender form with longer caudal peduncle, the much longer lower lobe of the pectoral fin, the reduction of the plates on the breast and behind the vent, and the absence of the series of spinelets on the eyeball, characteristic of all other known species of the genus.

Dorsal, VI, 7; anal, 7; pectoral, 14; lateral line, 43.

Head short and broad, the greatest depth eight-tenths the greatest width. Snout short, broadly triangular on its dorsal aspect, marked by a transverse depression behind the nasal spines. A shallow transverse depression behind the eyes and a deeper one behind the occiput. Width and depth of the body about equal under the middle of the spinous dorsal.

Ridges and spines similar to those in *X. latifrons*, but not so strong. Interorbital space shallowly concave, narrow, without secondary ridges. No preocular spines; a pair of slender postoculars; 2 pairs of occipitals; a pair on the shoulder; nasal spines strong. The plate at tip of snout freely movable, bearing a single strong erect spine, somewhat curved backwards; lateral angles of the plate bound down by the integument, not terminating in free spines. A single slender spine near posterior end of subocular ridge, and one behind it at angle of preopercle. Opercular ridge weak, the striations which diverge from the ridge above and below and cover the opercle in *latifrons* nearly or quite obsolete in this species. Margin of preopercle entire. Cheek below the subocular ridge unarmed, without plates or prickles. Eye very large, 2.75 in head, the surface wholly smooth, without trace of the strong spinelets present on *latifrons* and other species.

Mouth horizontal, broadly U-shaped, the maxillary extending slightly beyond the front of the eye. Teeth in broad villiform bands on the jaws; vomer with a subcircular patch, truncate posteriorly; palatines with well-developed lenticular patches, as broad as the mandibular band. A single long white maxillary barbel (forked at tip on one side, in the cotype) and one or two pairs of short mandibular barbels arising from the margins of the anterior pores. Gill membranes with a wide free margin posteriorly.

Plates and spines essentially as in *latifrons*, but the spines more slender; in the ventral series, only a few of the anterior plates bear spines, and in the dorsal series the plates are smooth opposite the posterior portion of the soft dorsal; with these exceptions, all the

series are spinous throughout. A few imbedded plates between the mandibular rami. Breast plates thin, flexible, scale-like, with concentric rings and weak radiating lines, so reduced that the anterior ones, at least, are not in contact. The paired postanal plates, so strongly developed in *latifrons*, are in this species obsolescent or wanting, or concealed beneath the integument.

Vertical fins inserted more anteriorly than in *latifrons*, the distance from tip of snout to front of dorsal two-sevenths the total length to base of caudal (one-third that distance in *latifrons*). First dorsal spine inserted on the seventh plate, the last spine on the twelfth; first ray of second dorsal on the seventeenth, the last ray on the twenty-second. Behind the last dorsal ray are 18 or 19 plates (always 16 in *latifrons*). Anal inserted one plate in advance of the second dorsal. Spinous dorsal and anal convex in outline, the second dorsal emarginate. Pectoral deeply notched, the lower four rays greatly thickened, the uppermost of these modified rays the longest, the slender ray above it only two-thirds its length. In *latifrons* the posterior margin of the pectoral nearly truncate, the lower 5 rays thickened, the upper modified ray but little produced beyond the one above it. Ventrals short, reaching less than one-third the distance to front of anal, the vent immediately behind their base.

Color dusky olive, whitish on breast and underside of head and on lips. Tip of snout, a blotch below the eye, and preopercles blackish. A black blotch downward from shoulder, involving base of upper pectoral rays. A series of oblong black blotches on sides, varying somewhat in number, size, and position. Basal portion of spinous dorsal white, the margin broadly black, the black area extending down nearly to base anteriorly on the membrane between first and second spines. Basal half of second dorsal translucent whitish, the distal half black, the two areas separated by a horizontal line. Caudal rays black throughout, the membranes lighter. Ventrals white; pectorals with the membranes light, the rays dark.

Measurements in hundredths of length to base of caudal:

	<i>Leiops</i> type.	<i>Leiops</i> cotype.	<i>Latifrons</i> Station 4480.
Length of head.....	20.8	21	21
Length of snout.....	6	6	6
Diameter of eye.....	7.3	8	7.5
Interorbital width.....	1.9	2	2.9
Width of head.....	12	12	13
Depth at occiput.....	9	9.5	10.5
Length of maxillary.....	6	6.5	6.5
Width of mouth.....	5.5	6	5.9
Width of body at axil.....	8.5	8.8	10
Greatest depth of body.....	10.5	10	11.3
Length of caudal peduncle.....	42	45	41
Distance from tip of snout to front of—			
First dorsal.....	28.5	30	34
Second dorsal.....	45	45	47
Length of tenth pectoral ray.....	11	13.5	16.9
Length of eleventh pectoral ray.....	17	19	16.5
Total length without caudal, in millimeters.....	169	133	132

Known only from the type and a single paratype from the same station.

X. latifrons.

1. No black blotches on sides.
2. Black margin of spinous dorsal of uniform width.
3. 14 to 16 plates in median series behind dorsals.
4. A series of 4 to 6 strong spinelets on eyeball.
5. 3 to 5 pairs of well-developed postanal plates.
6. Plates on breast stronger, usually in contact, completely covering the area.
7. Pectoral nearly truncate, the thickened lower rays 5 in number, the longest of these little produced beyond general margin of fin.
8. Vertical fins more posteriorly inserted, the length anterior to the spinous dorsal one-third the total to base of caudal.
9. Caudal posteriorly rounded.

X. leiops.

1. A series of oblong black blotches on sides.
2. Black margin of dorsal widened anteriorly to include greater part of first interspinous membrane.
3. 18 or 19 plates behind dorsals.
4. No spinelets on eye.
5. Median pairs of postanal plates little developed, hidden beneath the integument.
6. Plates on breast weaker and smaller, the anterior at least widely separated.
7. Pectoral deeply notched, the thickened lower rays 4 in number, the longest of these much produced.
8. Vertical fins more anteriorly placed, the predorsal length two-sevenths the total to base of caudal.
9. Caudal posteriorly truncate when spread.

XENERETMUS RITTERI, new species.

Plate 17, fig. 11.

Type-specimen.—Cat. No. 75814, U.S.N.M., 137 mm. long, from station 4366, near San Diego, depth 176 to 181 fathoms.

Most nearly allied, perhaps, to *X. latifrons*, but differing from the latter in the coloration, the increased number of rays in the pectoral fins, the presence of two maxillary barbels instead of one, and in the much stronger ridges and spines everywhere on head and body. Branchiostegal membranes with an extremely narrow free-fold posteriorly.

Dorsal, VII, 7; anal, 7; pectoral, 16; lateral line, 41.

Shape similar to *X. latifrons*, but more robust, both width and depth of body greater than in that species. Head short and broad, the snout even wider and more bluntly triangular than in *latifrons*, when seen from above. Interorbital space a shallow groove, somewhat wider than in *latifrons*. A deep transverse groove behind the nasal spines, one behind the eyes and one behind the occiput. Terminal rostral plate with a single curved upright spine smaller than the nasal spines; supraocular and two occipital pairs of spines, as usual. Subocular ridge higher than in related species and bearing stronger spines, two on the posterior part of the cheek and two on the preopercle. No spines on margin of preopercle below the ridge. Cheeks below the suborbital ridge naked, without plates or prickles.

Opercular ridge much more conspicuous than in *latifrons*. Margin of preorbital entire.

Mouth wide, maxillary extending scarcely beyond the front of the orbit. Teeth in wide villiform patches in jaws and on vomer and palatines, the vomerine patch emarginate posteriorly. Two barbels constantly present on the end of the maxillary, the anterior the shorter. Four barbels arise from the margin of pores near mandibular symphysis. Branchiostegal membrane with an extremely narrow free-fold posteriorly, where it crosses the throat. Eye contained slightly more than three times in the length of the side of the head; on the eyeball above the pupil a series of 5 to 7 strong spinules, hooked obliquely backwards and inwards toward median line.

Body with the ridges higher, the spines stronger, and the intervening faces more deeply concave than in *latifrons*, the arrangement otherwise similar. Four pairs of strong postanal plates present in the type, and 24 heavy plates on the breast. The ventral series of plates bear spines posteriorly as far as the front of the anal fin, all other series being strongly spinous throughout. No plates are present on the gular or branchiostegal membranes.

First dorsal spine inserted on the seventh, the last spine on the thirteenth plate of the dorsal series; first ray of second dorsal on the seventeenth, the last ray on the twenty-second plate. Anal fin inserted opposite the second dorsal. There are 16 plates (sometimes 15) behind the last dorsal ray. Pectoral wider than in related species, with 16 rays, the lower 6 or 7 thickened, with exerted tips. The fin is evenly truncate when spread, the lower rays scarcely protruding beyond the general margin of the fin; the membrane not incised between the upper unmodified and the lower thickened rays. Caudal rounded; ventrals reaching slightly more than one third the distance to front of anal fin, the anus immediately behind their base in adults, more posteriorly placed in the young.

Color olive-brown, darker than in related species, this strongly marked on the under side of the tail, where the dark area extends well forward of the anal fin. Breast, abdomen, and lower side of head white, as is also much of the postaxillary region. About 8 indistinct narrow dark crossbars on the back, better marked on the spines than on the intervening areas of the plates. A black blotch on the shoulder extending to the upper part of the axil. Pectoral translucent or whitish, a dark blotch occupying the base of the upper rays, and a wide dark bar on the distal half of the fin involving the rays only and not reaching their tips. Spinous dorsal with a broad black bar at base and a black margin, the rest of the fin whitish. Soft dorsal similar, but the basal black bar and the succeeding white bar narrow, the marginal black area involving more than half the fin. Caudal black, with a narrow white edge and an oblique whitish bar near base of upper half of fin. Ventrals and anal white.

Measurements in hundredths of length to base of caudal:

Length of head.....	24.5
Length of snout.....	6.5
Diameter of orbit.....	7.5
Interorbital width.....	2.7
Width of head.....	15
Depth at occiput.....	11.5
Distance from tip of snout to end of maxillary.....	7.5
Width of mouth.....	7.5
Greatest depth of body.....	13
Length of caudal peduncle.....	40
Distance from tip of snout to front of dorsal.....	32.5
Distance from tip of snout to second dorsal.....	49.5
Distance from tip of snout to anal.....	49
Length of second pectoral ray.....	16.5
Length of ninth pectoral ray.....	14
Length of twelfth pectoral ray.....	17
Length of sixteenth pectoral ray.....	6
Length of ventral fin.....	9
Length of caudal fin.....	13
Length of first ray of second dorsal.....	12.5
Total length to base of caudal, in millimeters.....	122

Four paratypes were obtained from the same station and one from station 4322, near San Diego, depth 227 to 193 fathoms. These specimens vary as follows: Dorsal, V to VII, 6 to 7; anal, 6 to 7; pectoral, 16 (17 on one side of one specimen), 6 or 7 of the lower rays thickened and exerted.

The species is named in honor of Dr. W. E. Ritter, director of the Scripps Institution for Biological Research.

XENERETMUS TRIACANTHUS (Gilbert).

In addition to the characters given in the preceding key to species the following may be presented: Prepectoral region, except that part opposite the upper two pectoral rays, covered with large plates, those in *latifrons* thinner and concealed. Breast wholly covered, the plates all overlapping. The normal arrangement of the breastplates is the following: The median series consists of two pairs in front of ventrals, with a minute plate lying posteriorly between the bases of the two ventral fins; in front of the paired plates are three median unpaired. At the side of the median series 4 plates form an anterior continuation of the ventro-lateral series, each plate with a slightly raised center. Between these and the series at base of pectoral fin is an irregular series of 4 crowded plates. There are also 4 at the base of the pectoral fin, the uppermost concealed beneath the integument. The minute plate between bases of ventral fins does not become enlarged and interpose between the plates of the posterior pair, as sometimes in *latifrons*. The commonest irregularity is in the coalescence of the anterior pair of median plates, or in the division of the median

plate which lies in front of the anterior pair. In different specimens, therefore, the number of paired median plates may vary from one to three.

There are three pairs of well-developed mental barbels.

Vomerine patch of teeth subcircular, the posterior margin indented. Palatine bands about as wide as those in jaws.

Small round spots (bright blue in life, surrounded by narrow dusky rings) are invariably present, though varying greatly in number. The most conspicuous spot occupies the depression on median line behind the supraocular spines. A smaller spot is usually present between the eyes, one on upper part of opercle, and one on median line of back between first and second pairs of dorsal plates. Other spots are less constant in position.

In 22 specimens the fin rays are as follows:

Specimens.....	Dorsal spines.		Dorsal rays.		Anal rays.	
	V	VI	6	7	6	7
.....	1	21	7	15	19	3

The pectoral rays are always 13 (9 + 4) in number. Median plates on caudal peduncle 16 or 17 in number.

List of stations.

		<i>Fathoms.</i>
4305	Off San Diego.....	67-116
4310	.....do.....	71- 75
4322	.....do.....	110-199
4343	.....do.....	55-155
4347	.....do.....	55- 68
4384	.....do.....	85-164
4385	.....do.....	80- 89
4453	Monterey Bay.....	49- 53
4457	.....do.....	40- 46
4460	.....do.....	55-167
4472	.....do.....	59- 71
4473	.....do.....	54- 65
4482	.....do.....	43- 44
4518	.....do.....	66-140
4554	.....do.....	60- 80

ODONTOXYXIS TRISPINOSUS (Lockington).

Taken at the following stations:

		<i>Fathoms.</i>
4309	Off San Diego.....	67-78
4452	Monterey Bay.....	49-50
4453	.....do.....	49-51
4454	.....do.....	65-71
4476	.....do.....	25-39
4477	.....do.....	11-19
4487	.....do.....	18-19
4489	.....do.....	18-20
4519	.....do.....	27-35
4550	.....do.....	50-57
4552	.....do.....	66-73
4562	.....do.....	10-11

CAREPROCTUS MELANURUS Gilbert.

A single specimen taken at station 4307, off San Diego, depth 169-496 fathoms.

PARALIPARIS CEPHALUS Gilbert.

4317	Off San Diego.....	<i>Fathoms.</i> 161-510
4334	.....do.....	514-541
4380	Off North Coronado Island.....	530-618

No trace of a membrane narrowing the wide gill-opening, which in all the specimens collected appears to extend from above the pectoral to a point entirely below the pectoral fin. The condition reported in one of the cotypes, which is said to have had the gill-opening restricted to the area above base of pectorals, has not been verified in any of the numerous specimens subsequently examined and must be considered questionable. Through an error in the original description, repeated by Jordan and Evermann,¹ the maxillary is said to be "slightly more than length of head." This should read slightly more than half length of head.

PARALIPARIS ULOCHIR Gilbert.

Two small specimens from stations as follows:

4516	Monterey Bay.....	<i>Fathoms.</i> 718-756
4538	.....do.....	795-871

The integument is largely lost, so the original color of these young specimens can not be given. The head is dusky and the abdomen lined with black.

PARALIPARIS MENTO Gilbert.

Plate 18, fig. 12.

One specimen, 75 mm. in total length, from station 4512, Monterey Bay, 309 to 536 fathoms.

Agreeing with the description of the type in the salient characters of this very striking species, but differing in certain details of measurement.

Length to base of caudal, 65 mm. Length of head, twenty hundredths of total length without caudal; greatest depth, at occiput, 22; greatest width of head, 12.5; diameter of eye, 5.5; length of snout, 6; interorbital width, 8.5; length of maxillary, measured from tip of snout, 9; width of gill-slit, 7.5; length of longest upper pectoral ray, 24; of longest ray of lower lobe, 25; of shortest ray in notch, 5. The chin is broad, rounded, and prominent, slightly protuding beyond the profile, but the mandibular margin shuts within the premaxillaries.

¹ Fishes of North America, p. 2141.

The pectoral is very low and with nearly horizontal base. The gill-opening is rather wide, but is entirely confined to the suprapectoral region.

Dorsal, 58; anal, 53; pectoral, 16.

The original description credits the type-specimen with having but 43 rays in the anal fin, but this is obviously a misprint for 53, as the dorsal and anal seem to differ in number by about 5 rays throughout this relationship.

PARALIPARIS DEANI Burke.

Paraliparis deani BURKE, Proc. U. S. Nat. Mus., vol. 43, 1913, p. 571; southeast Alaska.

A single specimen, 92 mm. long to base of caudal, from station 4540, Monterey Bay, depth 389 to 551 fathoms, probably belongs to this species. It agrees in most respects, but has a somewhat smaller eye and greater depth. The presence of prickles on the pectoral fins can not be verified.

The occiput is arched, somewhat as in *P. cephalus*, with broad interorbital area and wide blunt snout; the mouth is horizontal, the maxillary extending to below posterior fourth of orbit. Gill-opening wide, extending along the upper half of the pectoral fin. Upper ray of pectoral on a level with middle of orbit. Pectoral without deep notch, the lower three or four rays forming a lengthened lobe, the longest ray reaching beyond the front of the anal; the rays immediately above this lobe are more widely separated than those in the upper part of fin.

Length of head, twenty-two hundredths of total length without caudal; greatest width of head, 13; greatest depth at occiput, 19; width of mouth from angle to angle, 10; distance from tip of snout to end of maxillary, 11.5; to base of lowest pectoral ray, 13; to vent, 15.5; length of snout, 7; diameter of eye, 5; interorbital width, 14.

Dorsal, 59; anal, 49; pectoral, 16. General color light, the abdomen and eye blackish.

PARALIPARIS ALBESCENS, new species.

Plate 18, fig. 13.

Type-specimen.—Cat. No. 75816, U.S.N.M., a female with well-developed ova, 63 mm. long, from station 4515, Monterey Bay, 198 to 495 fathoms.

Not closely related to any other species, the head, body, and fins uniformly translucent or whitish, the gill-slit wide, extending to opposite tenth or eleventh pectoral ray, the upper ray of pectoral fin on level of middle of eye, the fin many-rayed, short, moderately notched, the rays of lower lobe all widely exerted, the longest equaling those of the upper lobe.

Length of head twenty-four one-hundredths of total length without caudal; width of head behind orbits, 15.5; depth at occiput, 21;

diameter of eye, 6; length of snout, 6; axial length of snout, 4; length of maxillary (from middle of premaxillaries), 8.5; width of mouth between the outer angles, 13.5; length of gill-slit, 9.8; distance from tip of snout to vent, 20; to lowest pectoral ray, 15.5; distance between lowest pectoral rays of the two sides, 5; distance from tip of snout to front of anal, 33; to front of dorsal, 24; length of pectoral base, 12.5; longest ray of upper lobe, 14.5; longest ray of lower lobe, 17. Dorsal, 3+46; anal, 44; pectoral, 18.

Head short and broad, with large eyes and very short snout, the latter protruding slightly beyond the mouth; mouth horizontal, the maxillary reaching to below middle of eye. Teeth acute, simple. Nostril single, without tube. Gill-opening extending down to opposite the tenth or eleventh pectoral ray. Pectoral inserted high, the upper ray on level of middle of eye, the lower ray in a vertical line which falls behind the orbit; the two fins well separated below. All the rays of lower lobe are widely exerted; none extend beyond front of anal. The lobes are short, and are connected a rather deep notch, with two or three widely spaced rays. Anus below the middle of the opercle.

Dorsal beginning above the upper end of gill-slit, the first three rays exceedingly delicate and spine-like, apparently separated from the others by a short interval of membrane which contains no rays. The caudal contains four fully developed rays, its basal third joined to dorsal and anal.

Color translucent or whitish throughout, the sides with minute distant black specks, visible only with aid of a lens. Mouth gill cavity and peritoneum without black pigment.

Only the type known.

PARALIPARIS CAUDATUS, new species.

Plate 18, fig. 14.

Type-specimen.—Cat. No. 75815, U.S.N.M., 86 mm. in total length (77 mm. to base of caudal). from station 4527, Monterey Bay, 183 to 337 fathoms.

Resembling *P. ulochir* in the restricted gill-slit and the wide pectoral, but differing among other characters in the shorter, deeper body, and the wider, many-rayed caudal fin. In *P. ulochir*, the trunk tapers to an extremely slender tail, the fin composed of but 4 rays. In *P. caudatus*, the base of the caudal has an easily appreciable width and the fin contains 10 or 11 rays.

Length of head thirty one-hundredths of total length to base of caudal; greatest width of head, 17; greatest depth (at nape), 26; length of snout, 9; diameter of eye, 5; interorbital width, 12; length of maxillary, 13; width at outer angles of mouth, 15; width of gill-

slit, 5.5; distance from tip of snout to anus, 21; to base of first dorsal ray, 30; length of caudal, 13; width of pectoral base, 18; longest ray of upper pectoral lobe, 14; of lower pectoral lobe, 28; of shortest rays in notch, 5.

Dorsal, 53; anal, 50; pectoral, 28.

Dorsal profile strongly arched at occiput and nape, the origin of dorsal but little behind the apex of the arch. Profile of head strongly declivous, that of snout nearly vertical; interorbital region transversely wide and flat; mouth horizontal, at lower profile, the snout protruding a trifle beyond the premaxillaries; maxillaries extending to below posterior margin of pupil; majority of the teeth in both jaws rather short triangular, with a distinct pair of lateral cusps, a few of the teeth at the margin of the band simple. Gill-slit short, confined to suprapectoral area, covered by a long tongue-shaped opercular flap; nostril single, with slightly raised margin; pores on head rather small. Vent well forward, under the posterior margin of cheek.

Origin of dorsal vertically above anterior part of gill-slit; basal fourth of caudal fin attached to dorsal and anal. Upper pectoral ray on level of middle of eye, the lower rays of the two fins closely approximated under the posterior portion of the eye. Upper pectoral lobe short, wide, and bluntly rounded, scarcely reaching vertical from front of orbit. The three lower rays are short and largely free, the four above it forming a very long narrow lobe, with only the tips free, extending beyond the front of the anal. Above these, the fin is abruptly and deeply notched; the rays in the notch very delicate, but little more widely spaced than the rays above.

Peritoneum and lining of gill-cavity black, showing through the integuments. Caudal fin and the neighboring parts of dorsal and anal dusky. Eye dark. Head and body otherwise light in color, perhaps reddish in life.

Only the type known.

RHINOLIPARIS ATTENUATUS Burke.

Three specimens of this species were taken at the following stations:

4515	Monterey Bay	Fathoms. 198-495
4540	.....do	389-551
4541	.....do	381-633

There seem to be typically 7 rostral filaments, 3 in an upper series, with the unpaired filament on the median line, and 4 in a lower series of 2 pairs. In 1 specimen, the pyloric cæca are 7 in number. The pectoral rays are 21. Branchiostegals 6.

LIPARISCUS, new genus (*Liparididae*).

Allied to *Paraliparis* and *Nectoliparis*, agreeing in habit with the former, and with the latter in having but 5 branchiostegal rays, while all other genera and species in this group have 6.

No trace of a ventral disk. Vent posterior in position, lying in the area between the lower pectoral lobes. Pectoral fin greatly reduced, but the two lobes connected, not separate and distinct as in *Nectoliparis*. Teeth simple, in narrow bands. Branchiostegals 5. Gill-slit narrow, confined to the suprapectoral region.

Type of the genus.—*Lipariscus nanus*, new species.

LIPARISCUS NANUS, new species.

Plate 19, fig. 15.

Type-specimen.—Cat. No. 75817, U.S.N.M., 47 mm. long, from station 4461, Monterey Bay, 285 to 357 fathoms.

Length of head twenty hundredths of total length to base of caudal; length of snout, 5; width of interorbital, 8; diameter of eye, 6; width of head, 13; length of maxillary, 8; length of gill-slit 2.5; pectoral greatly reduced, enveloped in a thick membrane, its upper ray on a level with lower margin of pupil. The lower lobe consists of only 2 rays closely apposed and but slightly lengthened. The total number of pectoral rays is 12 or 13, the upper lobe also short, the intermediate rays in the notch 2 or 3 in number, more widely spaced than the other rays. Lower pectoral rays separated by a wide interval.

Body deepest at front of dorsal, the occiput not gibbous. Interorbital space narrow, equaling the diameter of the eye. Snout short, very bluntly rounded, the mouth inferior, horizontal, the maxillary reaching a vertical from hinder edge of pupil. Nostril without tube.

Caudal narrow, with 4 rays, its basal fourth joined to dorsal and anal. Gill-slit very short, confined to area above base of pectoral; a narrow triangular opercular flap. Vent posterior in position, under the middle of the base of the pectoral. Snout and sides of body dusky; lining membranes of mouth, gill cavity and abdominal cavity jet black, the opercular region and the abdomen thus appearing black.

One paratype from the type-locality, and three others from station 4468, Monterey Bay, 32 to 309 fathoms.

NECTOLIPARIS PELAGICUS Gilbert and Burke.

A very widely distributed deep-pelagic form, extending from the coast of southern California throughout the Bering Sea and south to the shores of Hokkaido, Japan. It has been frequently captured in Bering Sea in open intermediate nets dragged at 300 fathoms. In the present collection, several specimens are included, which apparently entered the open trawl on its way to the surface.

List of stations.

		Fathoms.
4333	Off San Diego.....	301-487
4423	Off San Nicolas Island.....	581-594
4539	Monterey Bay.....	465-609
4541	.....do.....	381-633

RHINOGOBIUS NICHOLSI (Bean).

Abundant in the harbor at Avalon, Catalina Island. Has also been taken in shallow water, but not between tides, at Monterey.

RATHBUNELLA HYPOPLECTA (Gilbert).

A young specimen 29 mm. in extreme length, was taken by the "tangles" on rough bottom near Santa Rosa Island (station 4431), in the Santa Barbara Channel, at a depth of 38 to 41 fathoms. On account of its small size, it is not possible to verify the characters alleged to distinguish this species and the very closely allied *R. alleni*. The scales are not yet fully developed, but leave the top and sides of head, the nape, and a strip along base of dorsal fin naked. The depth is one-seventh the length to base of caudal. The first five dorsal rays are shorter than the succeeding and appear slightly differentiated.

The color pattern is sharply defined on a light background. Along median line of sides, runs a narrow brown streak, marked below by about 10 V-shaped prolongations, and above by an equal number which alternate with the first. The basal half of the dorsal fin is marked by 14 or 15 small dark brown spots, evenly spaced. Anal with a narrow submarginal black streak edged with white. Pectorals, ventrals, and anal unmarked. Dorsal, 46; anal, 32.

PLECTOBRANCHUS EVIDES Gilbert.

Several specimens, from the following stations:

		Fathoms.
4322	Near San Diego.....	110-199
4365	.....do.....	130-158
4367	.....do.....	201
4475	Monterey Bay.....	58-85

Only the type was heretofore known, taken on the coast of Oregon at a depth of 46 fathoms.

The two canines in the front of the jaw, strikingly developed in the type, are little evident in the majority of these specimens. The nostril is provided with a very thin walled tube, which greatly resembles a simple flap when collapsed, and was so described in the type. As in *Poroclinus hemphilli*, there are no pores along the course of the lateral line, but a series of imperforate papillæ mark its course. A series of similar papillæ, more closely crowded, on the suborbital area.

CRYPTOTREMA CORALLINUM Gilbert.

One specimen, 134 mm. long, from station 4420, near San Nicolas Island, depth 32 or 33 fathoms.

The teeth have been inadequately described in the species. In the front of each jaw is a close-set series of strong conical teeth, the series continued on the lateral margins of the jaws and the teeth there greatly decreasing in size. Behind the outer series is a rather broad patch of short villiform teeth, which are confined to the anterior part of the jaw, the patch in the mandible smaller than that in the maxillary. A single more or less irregular series of small conical teeth on the vomer and the contiguous part of the palatines, the latter with only two or three of the teeth on its extreme anterior portion.

In the specimen before us the diameter of the eye is slightly less than the length of the snout, and is contained $4\frac{1}{3}$ to $4\frac{1}{2}$ times in the length of the head. The longest pectoral rays are below the middle of the fin, but the lowermost rays are progressively shortened. The black blotches on sides are formed as local intensifications of brownish bars which descend from the back. Each of the blotches is forked indistinctly, forming an inverted V.

EMBRYX PARALLELUS, new species.

Plate 19, fig. 16.

Type-specimen.—Cat. No. 75818, U.S.N.M., 387 mm. long, from station 4514, Monterey Bay, depth 394 to 406 fathoms.

Closely related to *E. crassilabris*, characterized by the parallel, nearly vertical sides of head, the thickened lips, the uniserial premaxillary teeth, and the dark coloration. From *crassilabris* it differs principally in the much broader head, and the more extensive scaling of the sides of the head. In *crassilabris* the greatest width of head is a trifle more than one-third the length of the head; in *parallelus* it is one-half that length.

Body very slender, the depth 14.3 times in the total length. Head with nearly vertical parallel sides, of nearly uniform width to the base of the snout, the outline of which is broadly rounded, seen from above. Lips and adjacent tissues soft and fleshy. Lower jaw included, shutting wholly inside the premaxillary teeth. Maxillary reaching vertical from middle of eye. Eye less than length of snout, 5.8 times in length of head. Premaxillary teeth cardiform, close set, in a single series, the teeth diminishing slightly laterally, the series short, extending but little more than half distance to angle of mouth. Mandibular teeth anteriorly in a broad band, the anterior and posterior series obviously enlarged, the band abruptly constricted at the middle of the side of the jaw and continued a short distance

laterally as a single series. Vomer and palatines toothless. Series of large pores along sides of snout and on mandibles, all other pores on head moderate or small; two of these conspicuously placed in the same vortical behind the orbit, one on the preopercular margin above its middle, and another nearly vertically above it at side of occiput. Opercular membrane forming a wide flap which overlaps the basal portion of upper pectoral rays. Lower end of gill slit scarcely below base of pectoral, opposite the middle of the rather long ventral fins.

Posterior line of occiput midway between the front of dorsal and front of eye. Axil of lower pectoral ray midway between the tip of the snout and the vent. Pectorals reaching half way from their base to the front of the anal fin; posterior margin of pectorals broadly rounded, the rays all branched, the lower rays with thickened membrane and exserted tips.

Vertical fins scaled nearly to their tips; pectorals with about half of the posterior face and the basal third of the anterior face scaled. Occiput covered with reduced scales nearly as far forward as the eyes; opercles, subopercles, the upper branchiostegal ray, and the greater portion of the cheeks and preopercles covered with densely crowded very small scales.

Lateral line running from shoulder obliquely downward to slightly below middle of body, traceable backward to within a head's length of the tail, having regained middle of body at this point.

Color dark-brownish or purplish, the lower side of head and the fins darker. Lining of mouth, gill cavity, and body cavity black.

Measurements in hundredths of total length:

	<i>Paral- lelus.</i>	<i>Crassi- labris.</i>
Length of head.....	15	14.2
Length of snout.....	3.9	3.6
Diameter of eye.....	2.6	3.2
Greatest width of snout.....	6.6	4.8
Greatest width at cheeks.....	7.5	5
Greatest width at opercles.....	7.5	4.8
Length of maxillary.....	5.5	4.8
Length of mandible.....	6.5	6.5
Distance from tip of snout to posterior line of occiput.....	9.5	9.7
Distance from posterior line of occiput to front of dorsal.....	7.5	7.8
Distance from tip of snout to vent.....	28	28.5
Length of pectorals.....	8.3	7.3
Length of ventrals.....	2	1.5
Depth of body.....	7	6
Total length in millimeters.....	387	303

Only the type known.

APRODON CORTEZIANA Gilbert.

4423. Off San Nicolas Island, 216 to 339 fathoms.

FURCIMANUS DIAPTERUS (Gilbert).

Males are much less abundant than females and are recognizable externally by the much larger mouth and the stronger teeth, the maxillary extending to a vertical which traverses the middle of the orbit, while in females a vertical line from the tip of the maxillary passes through the front of the pupil, or a trifle behind that point.

List of stations.

		<i>Fathoms.</i>
4323	Off San Diego.....	193-227
4325	.....do.....	191-292
4326	.....do.....	243-280
4369	.....do.....	260-284
4509	Off Monterey Bay.....	152-286
4510	.....do.....	91-184

LYCONEMA BARBATUM Gilbert.

A single specimen at station 4358, off San Diego, depth 167 to 191 fathoms.

Measurements in hundredths of total:

Total length, including caudal.....	<i>mm.</i> 121
Length of head.....	18.5
Length of snout.....	4.6
Diameter of eye.....	6
Greatest depth.....	9.5
Distance from snout to front of anal.....	34
Distance from snout to front of dorsal.....	21
Length of pectoral.....	9.5
Length of ventral.....	2.5

So far as known, this species is confined to southern California. The statement by Jordan and Evermann¹ that it inhabits the coast of Alaska is without warrant.

MAYNEA CALIFORNICA, new species.

Plate 19, fig. 17.

Type-specimen.—Cat. No. 75819, U.S.N.M., 140 mm. long, from station 4421, off San Nicolas Island, 229 to 298 fathoms.

Dorsal 110, anal 93, both counted to middle of caudal fin; pectoral, 12.

Length of head, fifteen hundredths of total length; length of snout, 3.5; diameter of eye, 2.3; interocular width, 2; maxillary length, 5; greatest width of head, 6; length of gill-slit, 5; greatest depth of body, 9; predorsal length, 18; length before anal fin, 36; width of pectoral base, 3; length of pectoral, 8.

Body slender, moderately compressed, deepest at abdomen; occipital region approximately quadrangular in cross section, the upper sur-

¹ Bull. 47, U. S. National Museum, pt. 3, 1898, p. 2475.

face nearly flat, the cheeks vertical; snout broader than long, little declivous, depressed, subacute; nostril tube single, short, immediately behind the upper lip; mouth moderately oblique, distance between angles of mouth equal to length of gape; tip of maxillary extending nearly to below middle of eye; jaws about equal, the lower scarcely included within the upper; upper jaw not protractile, the lower lip with a frenum; no barbels; teeth all short, conical, strong; premaxillary teeth anteriorly in two well-separated series, those of the anterior series larger, the posterior series alone continued laterally, but not reaching much beyond middle of gape; mandibular teeth somewhat larger, in a double series anteriorly, with a few irregularly interposed teeth near symphysis, the posterior series continued farther laterally than the anterior series; strong conical teeth in a single series on palatines, these larger than the teeth in the jaws; a single series on head of vomer, with a few scattered teeth behind it. Skull firm, no large mucous channels or pits in any of the bones; a series of large pores around the eye, one along mandible and preopercle, and a series curved forward from shoulders across occiput. Gill-openings narrower than in *Bothrocara*, the distance between their lower ends equaling the length of the snout, less than two-thirds the length of the gill-slit, which begins above the base of the pectoral and extends well below it. Gill-fringes ample, in 4 pairs, a wide slit behind the fourth arch; gill-rakers reduced to little more than papillæ, 13 in number on outer arch. Pseudobranchiæ obsolete. A single short, thick pyloric cæcum.

Origin of dorsal fin over middle of pectoral, the fin lower anteriorly. Dorsal and anal rays slender, once forked near the base, the posterior branch again forked at its middle, the anterior branch simple throughout; caudal rays only once forked. Pectorals with broad base, the posterior margin evenly rounded, the length slightly more than half head, more than one-third the distance from its base to origin of anal; pectoral rays twice or thrice forked.

Scales small, rounded, nonimbricated and rather distant, covering sides of body and basal portions of vertical fins; the pectoral fins and the distal portions of vertical fins, the nape and the entire head scaleless; scales on breast and belly much reduced, smaller and partially absorbed. No trace of lateral line. Skin on head and body not lax, the texture like that in *Lycodes*; fin membranes not thickened, except at base.

In spirits brownish yellow, darker along the back, a broad margin of the vertical fins and the entire pectorals translucent. Buccal and branchial cavities whitish, peritoneum slightly dusky. In life, the entire fish is tinged with light rose-red.

Type 140 mm. long, from station 4421, off San Nicolas Island, depth 229 to 298 fathoms. Only the type known.

Apparently closely allied to *Maynea patagonica*, but less robust, with sharper more-tapering snout, more posterior insertion of dorsal fin, longer pectoral fin and wider gill-slits. In *M. patagonica*, the dorsal fin has its origin in advance of the base of the pectoral; the pectoral fin is short, less than one-third the distance between pectoral base and origin of anal fin; and the gill-slit extends only to a point just below the middle of the pectoral base.¹ *M. patagonica* also is said to have developed pseudobranchiae.

Maynea bulbiceps Garman is apparently without pores on sides of head. The figure of the type represents the fin rays as simple, but in a note kindly communicated to me by Mr. Garman, I am informed that they are not simple, the median pectoral rays being thrice divided. *Gymnelis conorhynchus* Garman should apparently be referred to *Maynea* rather than to *Gymnelis*, the latter being characterized by the entire absence of scales. *M. conorhynchus* seems to have no pores on head, the dorsal and anal fins have less numerous rays, while the rays of the pectoral are more numerous than in *M. californica*; also, the suborbital ridge is swollen and prominent, making the mouth appear inferior. In other respects it appears closely related to *M. californica*.

LYCOGRAMMA, new genus (*Zoarcidae*).

A deep-sea Lycodid, without ventral fins, with wide gill-slits continued well forward under the throat, the two narrowly separated anteriorly; the bones of head deeply channeled for sensory canals; the body scaled; the lateral lines distinct, two in number, the anterior running high on sides, parallel with the back, discontinued at a point about one orbital diameter behind the vent; the posterior line beginning below and slightly in advance of this point and running along middle of sides to the tail.

Type of the genus.—*Maynea brunnea* Bean.

LYCOGRAMMA BRUNNEA (Bean).

Plate 20, fig. 18.

The following description is based on a specimen 271 mm. in total length from station 4380:

Dorsal, 107 (without caudal); anal, 92; pectoral, 17 on each side; upper lateral line with 25 pores.

Length of head, 24.5 hundredths of total length; diameter of eye, 5.3; interorbital width, 4.5 (bony interorbital width, 3.5); length of snout, 7.5; length of maxillary, 10; greatest postocular width of head, 10; distance between front ends of gill-slits, 1.3; distance from snout to front ends of gill-slits, 14; greatest depth of body, 15;

¹ See Proc. Zool. Soc. London, 1881, pl. 2, figs. C and D.

distance from tip of snout to base of first dorsal ray, 26.6; distance from tip of snout to vent, 40; length of longest dorsal rays, 7.2; longest anal ray, 5; length of pectoral. 12.

Body compressed, sides of head vertical, greatest depth at front of dorsal; profile of head declines in a straight line from occiput to snout, the profile of the latter rendered concave on account of its protruding terminal portion; end of snout vertical. In fresh specimens the eyes completely fill the sockets and the mucous pits are not conspicuous. Mandible included, shutting within the outer series of premaxillary teeth. Mouth oblique, the vertical from end of maxillary crossing eye behind its middle. Mandibular teeth in a broad band anteriorly, the outer series scarcely enlarged, the band rapidly tapering laterally to an irregular single series or a narrow band; premaxillary teeth consisting of an outer series, usually more or less enlarged anteriorly, and an inner series of shorter slenderer teeth directed downwards and backwards. The two series are widely separated anteriorly, but converge laterally, and both usually reach the angle of the mouth. Both anteriorly and posteriorly, small teeth may occur in greater or less numbers between the two rows, thus producing a broad band in front of jaw, and a narrow band at the side. Vomerine teeth in a single series or a short narrow transverse band of not more than two irregular rows. Palatine teeth in a single series, which is irregular or sometimes even two ranked, the series long, extending from near vomer to opposite angle of mouth; both vomerine and palatine teeth well developed throughout, in young as well as in adults, as strong as the premaxillary teeth.

A single short nostril tube. Gill-slits continued well forward under throat, separated by a narrow isthmus, which is behind the vertical from posterior margin of orbit a distance but little less than the ocular diameter. Branchiostegals 6. Pseudobranchiæ well developed, consisting of about 10 filaments. Gill-rakers short and broad, movable, abruptly curved below the enlarged spinous tip, 3+15 in number.

Body completely and rather closely scaled; scales on breast, belly, and nape much reduced in size; head naked; anterior portions of dorsal and anal fins enveloped in thick gelatinous tissue, and scaled almost to their margins; posteriorly the naked margin widens rapidly, until it embraces the entire height of the fins; pectorals scaled only on extreme base.

A narrow line of minute close set pores from near upper rim of orbit to posterior line of occiput, the line curved, with the convexity outward. Upper lateral line beginning at shoulder, rising gently and continued parallel with back to a short distance behind vent, containing 25 to 28 pores; lower lateral line beginning on middle of sides immediately in front of end of upper line, continued to base of tail, though frequently indistinct posteriorly.

Dorsal fin beginning immediately behind head, the posterior line of occiput midway between front of eye and base of first dorsal ray. Origin of anal under eighteenth dorsal ray. Pectoral broad, variable in length, but not nearly reaching vent. Rays of all the fins forked for a short distance near tips.

Color in spirits brownish or grayish brown, in life translucent olive, the dorsal and anal anteriorly narrowly margined with dusky, the marginal dusky streak widening and intensifying posteriorly until it includes the entire fin, and is jet black with a very narrow white edge. Mouth light, gullet and gill cavity brownish or black, the gill membranes with a broad sharply contrasting white edge. Gill arches not black. Peritoneum black; a black ring around vent.

List of stations.

		<i>Fathoms.</i>
4317	Off San Diego.....	161-510
4333	.....do.....	301-487
4351	.....do.....	423-488
4380	Off Coronado Islands.....	530-618
4403	Off San Clemente Island.....	505-599
4405	.....do.....	654-704
4407	Off Santa Catalina Island.....	478-600
4516	Monterey Bay.....	718-756
4540	.....do.....	389-551

BOTHROCARA REMIGERA, new species.

Plate 20, fig. 19.

Type-specimen.—Cat. No. 75820, U.S.N.M., a male, 283 mm. long, from station 4516, Monterey Bay, depth 718 to 756 fathoms.

Dorsal, 112 (without caudal); anal, 94; pectoral, 15 on each side.

Length of head, twenty-one one-hundredths of total length; horizontal diameter of eye, 4.6; width of frontal bone between orbits, 2.5; distance from tip of snout to front of eye, 6.1; length of maxillary, 8; greatest postocular width of head, 8.5; distance from tip of snout to front end of gill-slits, 12.5; greatest depth of body, 12; distance from tip of snout to base of first dorsal ray, 22; to vent, 35; from vent to base of pectoral, 16; longest pectoral ray, 17.5.

Occiput broad, with a median lengthwise keel. Interorbital region narrow, the median sensory pit longer and narrower than in *Lycogramma brunnea*, the pair behind it strongly diverging, while in *brunnea* they are nearly parallel. Tip of snout prominent above, the profile behind the tip concave.

Mouth horizontal, the mandible included, the tip of maxillary reaching a vertical from middle of eye. Premaxillary bands of teeth narrow laterally, widening in front, the outer series slightly enlarged, the inner series directed backwards and downwards; mandibular teeth uniform, small, anteriorly in a wide band which tapers laterally to a single series. Vomer with a short median patch on its

anterior end; palatine bone with a short series anteriorly, which may be irregular, almost two ranked, the length of the series about that of the premaxillary band in the type, much shorter than in *L. brunnea*. Gill-slits very narrowly separated below, almost reaching vertical from posterior margin of orbit. Branchiostegals, 6. Pseudobranchiæ well developed. Gill rakers slender, not long, with slender tip not decurved, 4 + 15 in number.

Head naked; body completely scaled, except possibly the extreme anterior border of nape; the scales diminish in size on anterior part of trunk, and become greatly reduced on nape, prepectoral area, belly, and breast. Vertical fins scaled almost to their tips anteriorly, the scaly area narrowing rapidly posteriorly. Pectorals scaled at base only. Lateral line single, pursuing a wavy course from shoulder obliquely upwards and backwards to near base of dorsal fin, along which it runs to near middle of length. A curved line of minute pores on occiput behind eye.

First dorsal ray inserted above opercular margin, the posterior line of occiput midway between first dorsal ray and front of eye. Origin of anal under sixteenth dorsal ray. Pectoral narrow, elongate, but shorter than head, the rays exerted at tips. All the fin rays are simple, not forked at tip. The pectoral rays vary from 13 to 16 in number, thus in 5 specimens: $\frac{13}{13'} \frac{13}{14'} \frac{14}{14'} \frac{15}{15'} \frac{16}{16'}$.

In spirits, light brownish, vertical fins margined with dusky anteriorly, becoming completely black posteriorly; pectorals whitish or dusky. Entire lining of mouth and gill cavity jet black, the gill arches also blackish; no conspicuous whitish margin to gill membranes. Peritoneum black.

Closely related to *B. alalonga* Garman, from the Gulf of California, but with larger eye, longer maxillary, shorter pectoral, longer trunk, and with nape, shoulders, breast, and belly scaled, and with a developed lateral line.

Relationship is also close to *B. mollis*, which has also a slender, long pectoral, with exerted tips to the rays. *B. mollis* has also a faintly marked lateral line pursuing the same course as in *B. remigera*, but shorter. *Bothrocara* is described as having the palate toothless, but *B. mollis* usually develops asperities on the vomer and palatine bones, and has occasionally well-marked bands of vomerine and palatine teeth.

In addition to the type, 3 smaller specimens were obtained at the same locality. The species is also known from the following stations:

2923	Off San Diego.....	Fathoms.	822
3075	Off the coast of Washington.....		859
3627	Off San Diego.....		776
4380	.....do.....		530

MELANOSTIGMA PAMMELAS Gilbert.

The type of this species was secured by the *Albatross* at station 3202, off Monterey Bay, California (not from the coast of southern Alaska, as given by Jordan and Evermann).¹ The three other specimens mentioned in the original description were from station 3126, also in the vicinity of Monterey. By the present collection, the range of the species is extended from Monterey to the vicinity of San Diego.

The 15 specimens secured vary widely in the amount of black pigment which they develop. The lining membranes of the mouth, gill-cavity, and body cavity are always jet black, and the anterior part of the head is externally blackish in all specimens. But the remaining parts vary from jet black through brownish black and gray to translucent, those from the same dredge haul usually agreeing in color. There is no evidence that this difference depends on the nature of the bottom, as all the specimens have been taken from green mud. But it is not improbable that this is a deep pelagic rather than a bottom form.

The fins were dissected out in one specimen, the dorsal containing 84 rays to middle of caudal, the anal 69 to middle of caudal, the pectoral 7 rays.

The jaws contain typically an outer series of widely spaced canines, but in some specimens these are much less developed, and may be scarcely larger than those behind them. In such cases the teeth are arranged in a band, rather than in a double series. The median tooth of the vomerine series may be enlarged and canine-like, or it may be no larger than the others. The extent to which the palatine series develops is variable, the series consisting in some cases of a few teeth at the extreme anterior end of the bone, in others extending farther back.

The minute size of the branchial opening sufficiently distinguishes this genus from *Bothrocara*.

List of stations.

		<i>Fathoms.</i>
4378	Off San Diego.....	376- 594
4425	Near Santa Cruz Island.....	1,084-1,100
4427	.....do.....	475- 510
4428	.....do.....	764- 891
4435	Santa Barbara Channel.....	274- 287
4512	Monterey Bay.....	334- 530
4513	.....do.....	389- 456
4514	.....do.....	394- 524
4540	.....do.....	389- 551
4541	.....do.....	381- 633
4543	.....do.....	118- 53

¹ Bull. 47, U. S. Nat. Mus., p. 2491.

CATAETYX RUBRIROSTRIS Gilbert.

Three specimens obtained at the following stations:

		Fathoms.
4317	Off San Diego.....	161-510
4341	.....do.....	188-323
4418	.....do.....	238-310

LYCODAPUS DERMATINUS Gilbert.

Reexamination of the type of this species indicates that it is a well-marked form of which no second specimen apparently has been obtained. It belongs at the *fierasfer* end of the series, having fine teeth in the jaws, disposed in comparatively narrow bands, all concealed when mouth is closed; it has several teeth on the vomer and has comparatively slender gill-rakers, which are longer than they are wide at the base, and are 10 or 11 in number on anterior limb of outer gill-arch.

The vomerine teeth are characteristic, being stronger than any of the other teeth. They are 6 in number, canine-like, curved, the median teeth directed downward, those at the sides strongly outward and backward. In *L. fierasfer*, the vomerine teeth are minute and are typically 10 or 12 in number. Palatine teeth in *L. dermatinus* small, almost 10 in number, a wide interval separating them from the vomer. The fin rays apparently are less numerous in *L. dermatinus* than in any other species, the dorsal containing but 70 rays.

Measurements in hundredths of total length without caudal fin.

Length in millimeters to base of caudal.....	108
Length of head.....	21.5
Length of snout.....	6.2
Diameter of eye.....	3.8
Length of maxillary.....	9.8
Greatest width of head.....	8.5
Greatest depth of head.....	12
Distance from snout to anal.....	36
Distance from snout to dorsal.....	23
Length of pectoral.....	9
Length of caudal.....	4

LYCODAPUS MANDIBULARIS, new species.

Plate 20, fig. 20.

Type-specimen.—Cat. No. 75823, U.S.N.M., 165 mm. long, from station 4533, Monterey Bay, California, depth 144 to 293 fathoms.

Total length to base of caudal 160 mm., the following measurements in hundredths of this length: Length of head, 16.3; width of head, 7; interorbital width, 5; diameter of eye, 3.2; length of snout, 5; length of maxillary, 7; distance from tip of mandible to posterior

margin of gill-membrane, 9; from posterior margin of gill-membrane to upper end of gill-slit, 11.5; greatest depth at nape, 11; at anus, 9; distance from tip of snout to front of dorsal, 19; to front of anal, 34; length of pectoral, 5.

Dorsal, 88; anal, 78; caudal, 5 or 6; pectoral, 8.

The upper outline of head is straight, not longitudinally concave with spatulate snout as in *L. fierasfer*; snout abruptly decurved at tip; mandible massive, deep, the symphysis slightly protruding; maxillary reaching vertical from middle of eye; teeth coarse, much larger and in much broader bands than in *L. fierasfer*, but of approximately equal size; a pair of premaxillary teeth in inner row near median line, and three or four in inner mandibular row near middle of ramus sometimes but not always a little enlarged, more or less canine-like. Teeth in both jaws widely exposed in closed mouth, the outer series in the mandible not enlarged. As in other species of the genus, the mandibular teeth are anteriorly in a broad band, which abruptly narrows laterally to a single or irregular double series; premaxillary band broad anteriorly, tapering laterally, but not to a single series.

Vomerine teeth strong, reduced in number to a single pair, or sometimes but a single tooth is present. Palatine teeth well developed in a single long series, similar to those in the jaws. Gill-slit extending well above base of pectorals, as in all other species except *L. parviceps*. Gill-membranes joined anteriorly and free from the isthmus, the width of the free fold equaling diameter of eye, the posterior margin of membrane on the vertical descending from hinder margin of eye. Gill-rakers broader than high—strikingly different in this respect from *L. fierasfer*—spinous on the inner margin, reduced anteriorly to tubercles, 12 in all on the anterior limb of the outer arch, one only above the angle.

Two well-developed pseudobranchial filaments in all specimens examined. *L. fierasfer* is described as having no pseudobranchiae, and in the majority of specimens no trace of them is to be found. But on one side of an undoubted specimen of this species, a single filament is present.

Series of mucous pores on head inconspicuous.

The length of the head and trunk is contained 3 times in the total length; depth of body, $9\frac{2}{3}$; length of head, $6\frac{1}{4}$.

The anterior 6 dorsal rays are exceedingly slender, and are unsegmented, the fully segmented rays beginning abruptly behind them.

First 3 anal rays also unsegmented, but not otherwise different from the succeeding rays.

Color pale throughout on body and fins, dark specks sparsely distributed, somewhat more numerous posteriorly. Anterior part of mouth colorless, becoming black posteriorly, the branchial chamber somewhat dusky and the peritoneum black, but these are scarcely

visible externally. In paratypes the posterior part of body and the corresponding portions of the vertical fins become dusky.

Cotypes were taken at the following stations:

4461	Monterey Bay	Fathoms.
4468	.....do.....	285-357
4539	.....do.....	32-309
		518-609

LYCODAPUS LYCODON, new species.

Plate 21, fig. 21.

Type-specimen.—Cat. No. 75822, U.S.N.M., 141 mm. long, from Albatross station 4509, Monterey Bay, depth 152 to 286 fathoms.

Measurements in hundredths of total length without caudal fin.

Length in millimeters to base of caudal.....	136
Length of head.....	16
Length of snout.....	5
Diameter of eye.....	3
Interorbital width.....	5
Length of maxillary.....	7.5
Greatest width of head.....	7.5
Greatest depth of head.....	9
Distance from snout to anal.....	34.5
Distance from snout to dorsal.....	18.6
Length of pectoral.....	6
Length of caudal.....	4

An elongate form with thick, loose skin, broad head, heavy jaws, very large teeth, and broad, short gill-rakers. In texture of the skin the species resembles *L. dermatinus*, but differs from it strikingly in proportions and in character of teeth and gill-rakers. It is most closely related to *L. mandibularis* and *L. grossidens*, but differs from both in proportions of head and body, in the general appearance, in the texture of the skin, and in the dentition, the palatine series of teeth being stronger than in any other known species.

The head is short, almost quadrate in cross section, the top of head broad and flat, the sides of head abruptly vertical. The premaxillary processes form a projection on snout, the upper profile of head otherwise straight. Nasal tubes short but evident, longer than in allied species. Mouth large, very oblique, the maxillary reaching a vertical line passing through eye just behind its middle. Jaws equal, with extremely broad dentigerous area, the teeth coarse, cardiform, widely spaced, many of them visible when the jaws are closed, and then failing to engage the teeth in the opposite jaw. The inner series of the mandible are somewhat enlarged and are directed backwards and towards the median line, a pair of the inner teeth near median line in premaxillaries are also a little enlarged. The largest teeth in the jaws are the external series in both upper and lower

jaws. These are widely spaced, are directed almost horizontally outward, are strongly curved, and are confined to the anterior half of the cleft of the mouth, 10 or 12 in number in each jaw. The vomer bears but a single tooth on one side the median line, equaling in size the smaller teeth in the jaws. Palatine bones with a single close-set series of short robust teeth, about 6 in number.

Gill-membranes rather broadly joined on the median line, wholly free from the isthmus, the free border on a vertical line from posterior border of eye. Gill-slit extremely oblique, extending above the pectoral for a distance equaling three-fourths width of pectoral base. Gill-rakers very short and broad, much broader than high, 10 on anterior limb of outer arch. Sensory pores on head strongly marked, especially 1 on middle of interorbital space, 1 above posterior margin of orbit, 2 in the nasal region, and a series of 3 on mandible. Several minute pores are evident on the preorbital, but none are visible elsewhere on head and none on sides of body. The skin is very thick and loose and renders it impossible to count the rays of the vertical fins without dissection.

The dorsal begins well behind the head, the posterior line of the occiput being midway between tip of snout and first dorsal ray. As in other species, the first rays are very slender and not jointed, the heavy articulated rays beginning with the tenth. All the rays are simple. Anterior 3 or 4 anal rays very slender, apparently not jointed.

Uniformly light in color, including the lining membrane of mouth and gill-cavity. Peritoneum jet black, not visible externally through the abdominal walls. On sides of head and body small dark spots are hidden under the thick integument.

Only the type known.

LYCODAPUS ATTENUATUS, new species.

Plate 21, fig. 22.

Type-specimen.—Cat. No. 75821, U.S.N.M., 163 mm. long, from station 4461, in Monterey Bay, depth 285 to 357 fathoms.

Measurements in hundredths of length to base of caudal:

Length of head, 14.8; of snout, 4.1; diameter of eye, 3; length of maxillary, 6.4; greatest width of head, 5.4; depth of head, 7.2; greatest depth of body, 6.4; depth at front of anal, 5; distance from tip of snout to front of dorsal, 16.3; to front of anal, 33; length of pectoral, 6.5.

Dorsal, 96; anal, 77; caudal rays not included in either case; pectoral, 7.

Body extremely attenuate, its depth less than that of head, less than one-fifteenth of total length.

Teeth coarse, in wide bands, not crowded, extensively exposed when mouth is closed; a pair in inner premaxillary series near median

line enlarged and pointed backwards; a few teeth along inner edge of middle of mandibular band somewhat enlarged; outer series on both jaws slightly enlarged, horizontally set, curved. A single vomerine tooth, smaller than those in jaws. Palatine teeth few in number, small but firm. Mouth not very oblique, the maxillary reaching vertical from middle of eye. Gill-rakers broad, short, 10 or 11 on horizontal limb of outer arch. Gill-slit extending above level of pectoral base for a distance equaling half diameter of eye. One or two well-developed pseudobranchial filaments present.

Skin thin, adherent, mucous pores very inconspicuous.

Color light, with scattered dark specks, not forming dark streaks along base of dorsal and anal as in *L. extensus*. The vertical fins become dusky towards tail. Mouth and gill cavity light or slightly dusky; peritoneum black, showing through the abdominal wall.

In its slender form this species resembles *L. extensus* and *L. parviceps*, but is apparently not closely related to either. From *L. parviceps* it differs in the wider gill-slit, which extends as in all other species save *parviceps*, above the base of the pectoral fin. From *L. extensus* it differs strikingly in the dentition, there being a single vomerine tooth and several short but rather strong teeth on each palatine, while *L. extensus* has numerous small vomerine teeth in a single series and no teeth on the palatine bones. Also, the upper outline of head is different, being straight with slightly prominent premaxillary processes in *L. attenuatus* and longitudinally concave with prominent occiput in *L. extensus*.

Direct comparison has been made with the type of *L. extensus*, but unfortunately that diminutive specimen is in a poor state of preservation, the vomerine teeth being lost.

L. attenuatus is closely related to *L. mandibularis*, *grossidens*, and *lycodon*, species with coarse teeth in wide bands, conspicuously exposed when the mouth is closed. They have also short, broad gill-rakers, which are broader at base than they are high. *L. attenuatus* differs from the others in its very elongate form and in the numerous rays in the vertical fins.

Only the type known.

The following species is here included, although from a more northern part of the coast:

LYCODAPUS GROSSIDENS, new species.

Type-specimen.—Cat. No. 75824, U.S.N.M., 105 mm. long, from station 3483, Bering Sea ($57^{\circ} 18' N.$; $171^{\circ} 18' W.$), depth 56 fathoms.

Total length to base of caudal, 102 mm., the following measurements in hundredths of this length: Length of head, 17.5; width of head, 7; bony interorbital width, 2; diameter of eye, 4; length of snout, 4.7; length of maxillary, 8; distance from tip of mandible to posterior margin of gill-membrane, 9; from posterior margin of gill-membrane to upper end of gill-slit, 10; greatest depth at nape, 9;

at anus, 7.5; distance from tip of snout to front of dorsal, 20; to front of anal, 36; length of pectoral, 5.

Dorsal, 81; anal, 72; caudal, 6; pectoral, 5.

Upper contour of head obliquely descending from occiput in a straight line, the occiput slightly depressed; snout not so deep as in *L. mandibularis*, the mandible less massive. Maxillary reaching a vertical dropped from posterior edge of pupil; jaws equal, the mandible not protruding. Teeth larger than in any other species of the genus, the anterior series in the symphyseal half of the mandible developed as curved canines, at first directed horizontally, and not opposed to any in the upper jaw. The outer series in the premaxillaries are sometimes also enlarged to form similar but smaller canines. Both mandibular and premaxillary teeth are in moderately broad bands anteriorly, the mandibular band is abruptly constricted posteriorly to a single series, the premaxillary band is narrowed laterally and in both jaws the lateral teeth are much reduced in size. Only one or two vomerine teeth present, the palatines in a single series, all very small.

Gill-slit extending well above base of pectorals; gill-membranes anteriorly joined and free from the isthmus, the posterior margin crossing the isthmus at a point slightly posterior to the mandibular joint. Gill-rakers short and rather broad, but narrower than in *mandibularis*, 11 or 12 on anterior limb of outer arch. Two or three short pseudobranchial filaments.

Mucous pores inconspicuous, but evident on top and sides of head, and in a short series on body immediately behind the head.

Ten or 11 anterior dorsal rays slender and unsegmented, the anterior 3 anal rays also unsegmented.

Color light, with sparse black specking on the body, this becoming more pronounced on posterior part of the body and on the vertical fins. Inside of mouth and gill-cavity largely black, as is also the peritoneum, the silvery pigment of the abdomen masking the black from without.

In addition to the type are 5 paratypes from station 4257, near Funter Bay, southeastern Alaska, depth 350 fathoms. One of these a young specimen.

NEMATONURUS ABYSSORUM, new species.

Plate 21, fig. 23.

Type-specimen.—Cat. No. 75827, U.S.N.M., 803 mm. long, from station 4390, off Santa Catalina Island, lat. 33° 02' 15" N.; long. 120° 42' W.; depth, 1,350 to 2,182 fathoms.

Dorsal, II, 10; pectoral, 19; ventral, 11.

Body deep; head without prominent ridges, projecting angles, or enlarged canals, the texture unusually firm. Anterior profile descending in an even curve from front of dorsal to tip of snout, the

lower profile of snout nearly horizontal. Snout short, depressed, its axial length 0.19 length of head, the distance from tip of snout to front of eye 0.23, from tip of snout to front of premaxillaries 0.11. Interorbital space very slightly convex, firm throughout and without ridges, a slightly depressed area on front of occiput. Interorbital width, 0.25 length of head; horizontal diameter of the oval eye, 0.21; maxillary extending beyond the orbit, 0.39; length of barbel, 0.16. A series of rather small conical teeth in each jaw, a very few similar but smaller teeth forming an inner series in the front of the upper jaw, the mandible with an inner pair at symphysis; teeth in lower jaw somewhat smaller than those above. Anterior nostril a widely opened cup, at the bottom of which the sensory membrane lies exposed. The walls of the posterior nostril are thin and the wide short tube is collapsed. Cheeks and suborbital area nearly vertical, without ridges. Preopercular margin nearly vertical, a little incurved above the angle, which gently protrudes. Branchiostegals, 6.

Dorsal originating just behind vertical from pectoral axil, the second spine smooth throughout, but with a few soft, not spinous, points on the anterior margin near tip, which are probably retrograded spinules. The tip of the spine protrudes beyond the rest of the fin as a very short filament, the length of the spine is 0.61 of length of head; base of first dorsal, 0.34; interspace between dorsals, 0.66. Length of pectorals, 0.62; outer ventral ray filamentous, its tip scarcely attaining the vent, 0.61. Vent immediately in front of origin of anal.

Pores of sensory canals large, the lateral line conspicuous, marked by a superficial, more or less interrupted, tube extending over the scales. Underside of snout thickly beset by small tubercles which probably have a sensory function. Similar structures accompany the lateral line, especially in its anterior part, certain of these being arranged in pairs, one immediately above the lateral line, the other vertically below it.

Scales on head rough, with three to five gently diverging ridges, which bear short spines along their course and do not project beyond the edge of the scale. Scales greatly reduced in size on lower part of cheeks, around the orbits and on snout. Lower side of head, including inferior surface of snout, the mandibles and the branchiostegal membranes, wholly scaleless. Scales on breast somewhat reduced in size and rough like those on head. Those on remainder of body have the margins entire, the rough area confined to the central portion of the scale within the margin, and often reduced to a few spinelets in a single median ridge.

Color: Head, body, and fins dark brown, blackish on breast and belly, and along edge of gill-membranes. Lining of mouth and gill-cavity and the peritoneum black.

Only the type known.

MACROURUS ACROLEPIS Bean.

List of stations.

		<i>Fathoms.</i>
4336	Off San Diego.....	518-565
4380	Off Coronado Islands.....	530-618
4387a	Off San Diego.....	1,059
4391	Off Santa Catalina Island.....	675-1,350
4405	Off San Clemente Island.....	654-704
4542	Monterey Bay.....	331-677

MACROURUS STELGIDOLEPIS Gilbert.

Station 4306, off San Diego, 207-497 fathoms.

LIONURUS LIOLEPIS (Gilbert).

List of stations.

		<i>Fathoms.</i>
4307	Off San Diego.....	169-496
4317	.....do.....	161-510
4333	.....do.....	301-487
4334	.....do.....	514-541
4335	.....do.....	500-530
4351	.....do.....	423-488
4353	.....do.....	628-640
4380	.....do.....	530-618
4400	Off San Clemente Island.....	500-507
4402	.....do.....	542-599
4405	.....do.....	654-704
4407	Off Santa Catalina Island.....	334-600
4415	Off Santa Barbara Island.....	302-638
4416	.....do.....	323-448
4423	Off San Nicholas Island.....	216-339
4425	.....do.....	1,084-1,100
4427	Off Santa Cruz Island.....	447-510
4428	.....do.....	764-891
4429	.....do.....	506-680
4507	Monterey Bay.....	308-383
4516	.....do.....	718-756

The pyloric caeca in this species are small, numerous, about 35 in number. The ventrals have 10 or 11 rays; branchiostegal rays, 7. The bands of teeth are villiform rather than cardiform, as originally described, the band rather wide, a distinct outer series of canines in upper jaw.

Scales largely fallen in all specimens, the few remaining showing that those on top and upper part of sides of head and on breast bear several (usually 4 or 5) parallel or weakly diverging series of spinules; scales of adjacent areas may show faint ridges, the others are smooth, unmarked.

LYOPSETTA EXILIS (Jordan and Gilbert).

Nothing is known concerning the southern limit of this species. It is very abundant along the coast of California, and has been dredged by the *Albatross* off the coasts of Oregon and Washington, British Columbia, and southeastern Alaska as far north as Wrangell. The depth is known to range from 40 to 200 fathoms.

The dorsal rays range from 77 to 85, most frequently 80 or 81; anal rays from 59 to 65, most frequently 61 or 62. There are usually

2, rarely 3, gill-rakers above the angle of outer arch; 9 to 11, rarely 12, below angle.

List of stations.

		<i>Fathoms.</i>
4305	Off San Diego.....	67-116
4309	.....do.....	67-78
4310	.....do.....	71-75
4311	.....do.....	110-143
4322	.....do.....	110-199
4356	.....do.....	120-131
4359	.....do.....	98-220
4364	.....do.....	101-129
4365	.....do.....	130-158
4366	.....do.....	176-181
4410	Off Catalina Island.....	178-195
4413	.....do.....	152-162
4447	Monterey Bay.....	52-42
4452	.....do.....	49-50
4455	.....do.....	62-56
4457	.....do.....	46-40
4460	.....do.....	55-167
4475	.....do.....	142-58

PSETTICHTHYS MELANOSTICTUS Girard.

List of stations.

		<i>Fathoms.</i>
4459	Monterey Bay.....	13-15
4477	.....do.....	11-19

HIPPOGLOSSINA STOMATA Eigenmann and Eigenmann.

Characterized by its large mouth, numerous gill-rakers, the large size of the scales on head and sides of body, the light and dark mottling of the vertical fins, and the sharply marked series of ocelli near dorsal and anal contours. In size of scales and in coloration this species agrees entirely with *H. bollmanni* Gilbert, from the coast of Ecuador, but the latter differs conspicuously in the reduced size and number of gill-rakers and in the shorter maxillary. *H. macrops* Steindachner, is known only from Mazatlan, Mexico, and from a single specimen collected by the late Admiral Beardslee, United States Navy, at Valparaiso, Chile. The gill-rakers in *H. macrops* are similar to those in *H. stomata*, but the maxillary is much shorter and more slender, and the scales on head are reduced in size and are crowded in much more numerous series than in *H. stomata*. The number of pores in the course of the lateral line is not materially increased in *macrops*, but the number of scales in a transverse series is greater, there being 27 to 30 in an oblique series from a point on lateral line just behind the arch upward and backward to base of dorsal, while in *stomata* and *bollmanni* there are 19 to 21 scales in a corresponding series. Steindachner's figure of *H. macrops* indicates faintly marked series of paired spots, with entire absence of ocellation, and uniformly dusky vertical fins. In the Valparaiso specimen, better marked ocelli are present, but the vertical fins are plain dusky. There is no trace of the pair of blackish spots just in front

of caudal fin on outlines of caudal peduncle, which are so conspicuous in *stomata* and *bollmanni*. In *stomata* there is a narrow rounded cutaneous flap, with conspicuous white margin, on lower edge of interopercle just behind mandibular articulation. This is present, though smaller, in *bollmanni*, and is barely perceptible in *macrops*.

H. stomata was originally known from two specimens taken in deep water off San Diego. It has since been dredged by the *Albatross* at a number of stations between Point Conception and Ballenas Bay, Lower California, these being the limits of the range so far as now known. The depth at which it has been taken ranges from 21 to 74 fathoms. By the expedition of 1904 a single specimen was obtained at station 4303, off San Diego, at a depth of 21 to 24 fathoms.

A table of measurements of *H. stomata*, *H. bollmanni*, and *H. macrops* is appended for purposes of comparison.

Measurements in hundredths of length without caudal.

	<i>Stomata.</i>		<i>Bollmanni.</i>		<i>Macrops.</i>
	Station 4303.	Station 2977.	Station 2505.		Valparaíso, Chile.
Length of head.....	34	36	34.5	33.5	33.5
Length of snout (from upper orbit).....	6.5	7.8	6.8	6.5	6.5
Longest (oblique) diameter of upper orbit.....	11	11.3	10.5	11.3	10.2
Length of maxillary.....	16	16.5	14	14	12.9
Greatest width of maxillary.....	3	3.2	2.8	3	2.2
Greatest depth of body.....	43	39	37.5	38.5	41
Least depth of caudal peduncle.....	10.5	8	9	9	9.7
Chord of arch of lateral line.....	19	19	17.5	19	19
Length of pectoral.....	18	17	16	16	17
Length of caudal.....	24	22.5	22	23	25
Length of longest gill-raker.....	3.5	3.2	2.5	3	2.3
Number of gill-rakers on outer arch.....	6+13 5+14	5+13 5+16	2+8 2+9	3+8 3+9	5+12 5+12
Number of dorsal rays.....	67	64	65	64	68
Number of anal rays.....	51	49	50	51	53
Number of tubes in lateral line.....	71	74	76	73	80
Length in millimeters to base of caudal.....	197	221	137	136	175

PLEURONICHTHYS VERTICALIS Jordan and Gilbert.

		<i>Fathoms.</i>
4420	Off San Nicolas Island.....	33-32
4442	Monterey Bay.....	26-31

PLEURONICHTHYS DECURRENS Jordan and Gilbert.

		<i>Fathoms.</i>
4422	Off San Nicolas Island.....	31-32

PLEURONICHTHYS RITERI Starks and Morris.

		<i>Fathoms.</i>
4304	Off San Diego.....	25

PAROPHRYS VETULUS Girard.

		<i>Fathoms.</i>
4459	Monterey Bay.....	13-15

LEPIDOPSETTA BILINEATA (Ayres).

4420	Off San Nicolas Island.....	Fathoms. 33-32
4474	Monterey Bay.....	43-34

Not hitherto reported from any point south of Monterey Bay.

MONOCERATIAS, new genus (*Ceratiidae*).

Most closely allied to *Diceratias* (*bispinosus*), differing in the much less oblique mouth, in the absence of the second cephalic spine, in the naked skin, and in the presence of a strong outwardly directed spine at the angle of the preopercle. From *Oneirodes* and *Paroneirodes*, it is distinguished by the single dorsal spine.

Body short and deep, compressed, the abdomen subglobular, the occipital region elevated and strongly convex. Mouth of moderate size and somewhat oblique, with unequal depressible teeth in jaws and on vomer. Gills $2\frac{1}{2}$, the outer arch without filaments. Dorsal spine single, the basal joint procumbent, not concealed; no caruncles. Skin with few scattered soft papillæ of small size. Pectoral multi-radiate. Gill-opening very wide, behind and below base of pectoral.

Type of the genus.—*Monoceratias acanthias*, new species.

MONOCERATIAS ACANTHIAS, new species.

Plate 22, fig. 24.

Type-specimen.—Cat. No. 75825, U.S.N.M., 80 mm. long, from station 4428, off Santa Cruz Island, Cal., depth 764 to 891 fathoms.

Dorsal, 6; anal, 4; pectoral, 15; caudal, 9.

Occipital region elevated, its profile strongly convex; interorbital fossa wide and deep; supraorbital rim widening behind, with an inner and an outer ridge, the intervening surface gently concave; the inner pair of ridges low and parallel, bounding the interorbital fossa, the outer pair higher, strongly divergent, each ending in a strong spine, directed obliquely upwards, outwards, and backwards; anteriorly, where the two ridges join, each rim is abruptly incurved, presenting a notched appearance seen from above. Least interorbital width at the notch three-tenths the distance between the supraorbital spines.

Mouth little oblique, the lower jaw strongly protruding beyond the upper, ending in an acute symphyseal process. Mandibular teeth depressible, in a single irregular series, longer and shorter teeth alternating, 13 to 15 in number; premaxillary teeth less than half the size of the mandibular teeth, otherwise similar, a wide median area toothless; vomer with 3 teeth on each side, in a single series, the median area naked; inner vomerine teeth minute, the middle pair of each group a little larger, the outer pair about as large as the largest mandibular teeth.

Two interlocking spines at the angle of the preopercle, the outer on the preopercle, directed outward and slightly downward, the inner on the mandibular margin, directed backward and slightly upward. A well-developed knob at the articulation of the maxillary. Rostral spine with long free basal joint projecting slightly beyond the upper lip, and half as long as the terminal joint, which reaches when depressed to a point above the middle of the orbit; the free end is somewhat enlarged, laterally compressed, provided anteriorly with a lappet or cirrus and posteriorly with a short fleshy process.

Upper end of gill slit behind middle of pectoral, the slit extending below the fin for more than the width of the pectoral base.

Papillæ minute, sparsely distributed everywhere on head and body.

Measurements in hundredths of length without caudal:

Length of maxillary (from articulation).....	34
Greatest depth of body.....	69
Length of head.....	65
Least interorbital width.....	10
Distance between supraorbital spines.....	26
Length of gill slit.....	22
Basal joint of rostral spine.....	12
Terminal joint of rostral spine.....	24
Distance from tip of snout to dorsal.....	75
Distance from tip of snout to anal.....	84
Length from tip of snout to base of caudal in millimeters.....	62

A single specimen known.